RHODESIA

REPORT OF THE SECRETARY FOR AGRICULTURE

for the period

1st October, 1970 to 30th September, 1971

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REPORT OF THE
SECRETARY FOR AGRICULTURE

Report of the Secretary for Agriculture

for the period 1st October, 1970 to 30th September, 1971

World agricultural survey

PRELIMINARY reports indicate that world agricultural production for 1970 will be up 2 per cent. on the static levels of the previous two years. In the same period world agricultural trade increased in value by 15 per cent. over the previous year. Prices of most agricultural commodities rose in 1970, especially coffee, fats and oils, oilcakes and meals, maize and sorghums. Any benefit from this which might have accrued to farmers has largely been absorbed by inflation. In general, the terms of trade for exporters of primary commodities have deteriorated by 4 per cent. compared with 1969.

Agricultural production in the developing countries showed an overall increase compared with the static output from the developed countries. However the higher value of world trade appears to have benefited the developed countries more than the developing countries. Indeed the share of the developing countries in world agricultural exports declined still further. Despite deliberate wheat curtailment policies adopted by the major wheat exporting countries and despite the 10 per cent. drop in the United States maize crop, total world grain output should equal the high levels of 1968 and 1969. Record grain crops were harvested in the U.S.S.R., China, India and Brazil.

Agricultural production in the United States rose by 1 per cent. A 4 per cent. drop in crop production was the outcome of maize—blight problems and wheat acreage restrictions. This reduction was compensated by increases in livestock products, cotton, soyabeans and sugar. The American tobacco crop increased by 6 per cent. A drastic 50 per cent. cut in the Canadian wheat acreage resulted in their lowest wheat harvest since 1914. This shortfall was made up to some extent by a 40 per cent. increase in their maize crop. It is obvious that the productive capacity in North America is significantly in excess of the foreseeable market requirements and it is to be hoped that the United States and Canadian governments will continue to restrain output.

In Western Europe agricultural production remained at the same level as the previous two years. Unfavourable weather together with policies designed to discourage wheat and dairy output held agricultural production down. In common with many other wheat exporting countries the switch in emphasis was to feed grains. The 4 per cent. reduction in West European wheat output was more than compensated by a 16 per cent. increase in maize production, with large record crops being harvested in France, Italy and Spain. A dairy cow slaughter programme reduced cattle numbers in the E.E.C. and contributed to the 3 per cent. increase in beef production. Pork and mutton output also increased in Western Europe.

After a poor season in 1969, agricultural output in the U.S.S.R. rose by 9 per cent., the major gain being cereal output which increased by 15 per cent. Severe floods in the Danube basin seriously affected output in Hungary and Roumania. Agricultural output in Eastern Europe fell by 1 per cent., with grain output declining by 11 per cent. Meat production in Eastern Europe continued to depend more on pigs and poultry than cattle. A reduction in beef output was more than offset by an increase in pigmeat and poultry. In the U.S.S.R. beef output increased at the expense of pork.

Despite a 30 per cent. reduction in the Argentine wheat crop, agricultural production in Latin America increased by 2 per cent. Cuban sugar output rose by 80 per cent. and the largest Argentine maize crop for 30 years pushed up maize output for the region by 2 per cent. Coffee output for the region was down by a third, as a result of a 50 per cent. cut in the Brazilian crop which came about through frosts and drought. A marked decline in Brazilian cotton production resulted in the regions output falling by 25 per cent. Beef production in Latin America rose by 2 per cent. which was well down on the previous five year average of over 4 per cent. Higher prices for coffee, sugar, bananas and maize contributed to an increase in the region's export earnings.

The main cereal grains of Asia, rice and wheat, both increased by 2 per cent. Wheat and rice output in India rose by 7 per cent. and 4 per cent. respectively, and groundnut output rose significantly. Good harvests have been recorded in Mainland China. Japanese agricultural production showed no increase, reflecting rice curtailment policies and reduced oilseed crops. The increase in the production of animal products in Japan continues and creates a demand for feed grains which encourages maize production in the Far East. Maize output in the Far East rose by 9 per cent., with a record crop being harvested in Thailand. Sugar production in the Far East increased by 2 per cent. Drought was prevalent in the Near East and reduced grain output.

Australian farm production fell by 3 per cent. as a result of a 30 per cent. cut back in wheat output. This reduction was largely made good by a 25 per cent. increase in feed grains. Sugar and meat production increased, but milk and wool output fell off. In New Zealand agricultural production remained static as a result of drought.

Grain and dairy output fell but meat production rose by 4 per cent.

Agricultural production in Africa, excluding South Africa, is estimated to have increased by 2 per cent. which, in contrast to the region's population growth of over 2,5 per cent. per annum, indicates a decline in output per head. Drought caused widespread crop failures in parts of Southern Africa and East Africa. West African groundnut crops were also affected by drought. A reduction in the Egyptian cotton crop accounted in part for a 10 per cent. fall in cotton output for the region. Coffee output for the region increased by under 2 per cent. Record tea crops were harvested in East Africa and cocoa production rose sharply. South African farm output rose by an estimated 1 per cent. Maize production increased by 40 per cent. which accounted for the overall 15 per cent. increase in the African region's maize output. Sugar output in Africa declined slightly as a result of a 14 per cent. decline in South African production.

World agricultural output for 1971 will undoubtedly exceed the 1970 crop level. Grains, which account for the largest component in world agriculture, should be well above the 1970 levels, for a record world wheat crop is forecasted and record maize crops have occurred in the United States, the Argentine and France. Except for Eastern Europe, favourable weather in the Northern Hemisphere will lead to good yields. Drought has affected crops in the Near East but there are no reports of crop failures in South America. Only average yields are anticipated in Australia for drought has affected parts of the grain areas. It has been forecast that the world trade in grains will fall off in 1971 and this could have an effect on total world agricultural trade. Figures for the E.E.C. bear this out, for as a result of a record grain harvest of over 10 per cent., the Community's grain deficit will be very small.

During the year under review the most significant event has been the successful conclusion of negotiations for the entry into the E.E.C. of Britain, Eire and Denmark, with Norwegian negotiations in the offing. The existing Community of six is the largest single importer of food and agricultural raw materials, currently accounting for a quarter of total world imports of these products. With its enlargement in 1973 to a Community containing 265 million people, the Community will have an even more important effect on world agricultural trade. Of concern to third countries such as Rhodesia is the Community's Common Agricultural Policy, which is designed to give considerable support to its farming population. The Community's market is heavily protected by import prices and levies which maintain high producer prices. Such surpluses as occur are offloaded on world markets. Britain's large food market will be presented to the Community whose producers will be given preferential entry terms. The Community's trading power has been re-inforced by the conclusion of preferential trading agreements with third countries in the Mediterranean area and in Africa. This creation of a large preferential trading bloc threatens the multilateral trading system and despite the political and economic advantages which will accrue from the enlargement of the E.E.C., the advantages may well be at the expense of world agricultural trade. The peripheral raw material producers of the world who have supplied the large and assured markets of Western Europe will be left with the Japanese market unless they can successfully compete against Western Europe's growing agricultural industry.

The Rhodesian season 1970–71

The season started off extremely well but with the virtual cessation of the rains in late January, crops failed to fill out to their full potential and what in January promised to be a really bumper harvest became a year of just above average yields. Early plantings came through whereas late planted crops failed. The livestock industry came through the season without difficulties for besides a mild winter, water supplies were in most areas adequate and grazing satisfactory.

The volume of agricultural output will probably match the record output achieved in 1968–69, and the value of output should be a record. However, the effect on net farm incomes will not be so marked since total inputs have risen considerably. Net farm incomes adjusted to the Cost of Living index should be up slightly on the satisfactory 1968–69 season.

A look back at agriculture during the sixties decade

The sixties decade has been of great significance to Rhodesian agriculture. Political, economic and climatic effects have had a considerable impact upon the industry's fortunes. From a climatic point of view it has been a dry decade with only three out of the ten seasons being what one could call good. Serious droughts occurred in 1963–64 and in 1967–68. The remaining five seasons were unsatisfactory. The drier regions of the south and south-west were hit by successive droughts from 1963–64 to 1965–66.

The early part of the decade saw the break-up of the Federation and there was some uncertainty as to the effect of Zambia's future agricultural policy on the Rhodesian industry. Zambia's stated aim was to achieve a greater measure of self sufficiency in agricultural commodities which had previously been supplied by Rhodesia. The main items immediately affected were poultry products and vegetables. To what extent this policy would have affected Rhodesia's agricultural industry was

overshadowed by U.D.I. in 1965 when Zambia imposed a trade embargo. This important export outlet was severed along with others. In the general turmoil of trade embargoes on an international scale the Zambian issue appeared rather small. The brunt of the sanctions war fell upon the tobacco industry, which in 1965 accounted for $66 million and almost half of the European agricultural industry's output. Another victim of the sanctions war was the sugar industry which at the Federal break-up had just emerged as a new and important foreign exchange earner. The rise in sugar production in the early years of the decade resulted in Rhodesia supplying the Federation with its entire needs in 1963. As a result of sanctions Rhodesia lost her quota agreement markets in Britain and the United States. The extremely depressed state of the sugar market in 1965 necessitated a contraction in output and sugar producers were forced to diversify.

The second half of the sixties decade saw a tremendous reorientation of the agricultural industry as efforts were made to diversify from tobacco. The problems of diversification have been manifold but resolved basically into two issues, namely marketing and production. In the siege economy in which Rhodesia found herself, it seemed a natural target to direct agricultural effort into the production of those foodstuffs and raw materials which had been previously imported. Thus we saw an expansion in wheat and fibre production. On the production side the problems facing tobacco producers were to expand their cropping acreages for the lower valued grain and fibre crops so as to retain their former levels of income. There was a rapid expansion in the area under crops (excluding sugar), with the result that in the second half of the decade 22 per cent. more land was under crops than in the first half of the decade. At the same time the physical volume of cash crops output increased by over 60 per cent. between the same two periods.

Two significant developments assisted the major restructuring of the industry which strangely enough had nothing to do with the sanctions war. The drought seasons in the earlier half of the decade brought about a shift in the cattle population from the drought stricken southern region of the country to the better watered areas of Mashonaland. Thus by 1966 Mashonaland had superseded Matabeleland as the major cattle province. It was apparent that beef production could be an important sideline enterprise to tobacco. The second important development also had its origin in the earlier drought seasons of the first half of the decade. In order to alleviate the effects of drought, Government established in 1966 the Farm Irrigation Fund. The fund enabled farmers to secure low interest rate loans to finance irrigation undertakings. Besides creating facilities for developing supplementary summer rainfall production and winter season production, the provision of irrigation water at reasonable cost assisted farmers to diversify and intensify their production.

The contraction in tobacco acreage and output in the second half of the sixties decade has been accompanied by an increase in volume of both cash crops (excluding sugar) and livestock products which amounts to 56 per cent. of the volume of production in the first half of the decade. The major growth points have been grains and fibre. In terms of total volume of output grains moved from a position of 56 per cent. in the first half of the decade to 67 per cent. in the second half of the decade. Fibre output increased its percentage from less than 1 to 5 per cent. of the total volume. The volume of livestock products has increased by 32 per cent., the major growth point being dairy products but significant increases in meat output have occurred. The share of livestock products in total agricultural output has fallen from 20 per cent. in the first half of the decade to just over 16 per cent. in the second half. In terms of total cash crops (excluding sugar) and livestock product output per acre, there has been an increase of 0,3 tonnes per acre from 0,8 tonnes in the first half of the decade to 1,1 tonnes in the second half. Part of this can be attributed to a reduction in the lower yielding tobacco crops and part to the two good seasons of 1966–67 and 1968–69.

In the face of the difficult circumstances surmounted by the industry during the decade it is surprising, but nevertheless gratifying, to record that the value of agricultural output has shown a fairly steady increase throughout, an exception being the disastrous drought year of 1967–68. The value of agricultural output has increased by some 40 to 50 per cent. over the period. However, the fact that this has been accompanied by an equally steady rise on the input side means that net farm incomes have been under pressure. In common with the agricultural sectors of most countries, net farm incomes have not kept pace with the advance in incomes in the industrial and commercial sectors of the economy. One cannot attribute all of this to sanctions since a decline in real income was noticeable in the early years of the decade. The 1967–68 drought dealt the industry a most grievous blow and of course sanctions have not enhanced the general situation. Farm incomes during this period have been propped to a modest extent by Government measures such as tobacco quota purchase arrangements and drought relief. There would appear to be some improvement since 1969 with the restoration of a more satisfactory level of incomes, however this has been largely attributable to the bumper 1968–69 season.

The restructuring of the agricultural industry since 1965 has been associated with a considerable increase in farm indebtedness. From the available statistics it appears that farm indebtedness since 1965 has increased by over 80 per cent. A sizeable proportion of this increase has been for long term finance associated with land purchase and long term improvements. Seasonal finance provided by the banks, co-operatives and commercial companies has increased but there has been a considerable increase in the finance provided by the Cold Storage Commission and the Agricultural Assistance Board. Only in 1967, in the aftermath of the good season, did the level of farm debt decline and this was accompanied by a corresponding increase in farm holdings of liquid assets. The general situation appears to be that with the pressure on farm incomes, farmers have found it increasingly difficult to finance agricultural investment from their own resources and have found it necessary to rely to an increasing extent on borrowed capital. This is not an uncommon occurrence and is to be found in the commercial and industrial sectors. It must be pointed out that debt, no matter how large, only becomes a problem when the available income is insufficient to meet the interest and repayment charges. When viewed in terms of the net farm income position since 1965 the apparent increase in farm debt does give cause for concern since it means that an enlarged proportion of that income is required to service that debt.

Government has played an active role in this restructuring exercise. It has lent the full weight of its technical and specialist expertise to the farming industry. With its limited resources it has endeavoured to cushion the industry from the severe pressures on farm incomes and to this end drought relief and aid to the tobacco industry has been provided. A debt reconstruction programme was set up in 1966 with the object of assisting farmers who had encountered difficulties in meeting their financial commitments due to drought circumstances. Changes have been made in the manner in which credit from public sources is provided to the industry. The object has been to control and rationalise credit from the public sector to the benefit of both lender and borrower. On the end product prices, the scope for adjustment on the major commodities is distinctly limited due to external marketing factors. Nevertheless over the decade prices for beef products have risen steadily and considerably. Maize prices have been fairly static though they have not been as high as they were in the opening years of the decade. Cotton prices have increased modestly but have levelled off in recent years. The prices for tobacco have not been as high as they were in the early part of the decade. A considerable infrastructure has been created in recent years by Government to handle and market grain, cotton, beef and tobacco. In 1967 a central marketing body, the Agricultural Marketing Authority, was established to co-ordinate the marketing of the previously independent Commodity Boards. Towards the end of the decade the Ministry of Agriculture assumed responsibility for Land Settlement. Priority has been given to assist the industry in reconstruction by way of land consolidation with a view to creating so-called viable agricultural units. Three-year price guarantees on maize and cotton were announced in 1970 with a view to improving the longer term farm income position.

If there are any lessons to be learnt from the past decade they are of a generalised nature. It should be apparent that the prosperity of any industry depends upon its ability to adjust in the technical and economic conditions in which it operates. The pressures of such conditions during the past decade have been particularly harsh. Nevertheless there are no grounds for supposing that these conditions will alter noticeably in the seventies decade. The existing pressures on farm incomes are likely to be maintained. An expansion in tobacco and sugar production if sanctions ease will assist greatly but will not provide a complete solution. Farm size adjustments or larger scale farming operations will inevitably place a strain on the financial resources and managerial skills of farmers. Government can to a limited degree create a favourable climate for the industry's healthy development but it is unable to offer hope to those individuals who enter the field with insufficient capital resources and over-optimistic expectations of the earning capacity of their farms when initially purchased, for invariably the repayment conditions on borrowed capital under such circumstances do not suit the flow of returns from the enterprises so financed. Finally it becomes increasingly apparent that there will be a continuing need for restructuring facilities to assist adjustments to changing circumstances. It is impossible to regard the reconstruction of the agricultural industry as a once and for all exercise to provide the final solution to the industry's problems. Although the general aim is to establish and promote long term viability in farming enterprises, to predict satisfactorily the characteristics required of a farm twenty years hence to satisfy a farmer's income requirements, is a hazardous undertaking. Situations, both in production and marketing, change rapidly. To anticipate these and to retain flexibility to adjust to them is both essential and difficult—but the effort must be unceasing.

LAND SUBDIVISION

Following the promulgation on the 1st January, 1970, of the Agricultural Land Settlement Act (No. 59 of 1969), which amended sections 76 (1) and 77 (1) of the Town and Country Planning Act [*Chapter 133*], an application to subdivide

land for agricultural purposes may not be granted by the Minister of Local Government and Housing except upon the recommendation of the Minister of Agriculture. So that he could be guided on agricultural subdivision applications, the Minister of Agriculture set up a Subdivision Committee which undertook the work previously done by the subdivision committee of the defunct Rural Land Board. This Committee, comprising a senior officer of the Ministry of Agriculture, a member of the Natural Resources Board and a member of the Agricultural Development Authority, held its first meeting on the 5th February, 1970, since which time it has met regularly each month.

From February, 1970, until the 30th September, 1971, 216 applications were examined by the Committee. Of the 155 applications which were approved, 84 were for the creation of new agricultural units, 46 were for the creation of new agricultural units plus the consolidation of portions of the land with existing farms and 25 were for consolidation of both subdivided portions with existing farms. Thirty-four applications were recommended for refusal. In the majority of cases, the Ministers of Agriculture and Local Government and Housing accepted the Committee's recommendation. Seven applications were withdrawn and there were 20 awaiting finalisation at the 30th September, 1971.

AGRICULTURAL LEGISLATION

In order to build up the long term infrastructure for agriculture on sound logical lines, three new Acts covering research, finance and development were added during 1971 to the statutes administered by the Ministry.

Marketing had been rationalised and co-ordinated through the creation of the Agricultural Marketing Authority in 1967.

In January, 1971, the Agricultural Research Council was established to keep under review and to promote all aspects of agricultural research in Rhodesia so as to ensure the maximum co-ordination between persons or authorities undertaking or about to undertake agricultural research, and to carry out research. Because some products were already covered by research bodies, forestry, tobacco, pigs and sugar were excluded from the Council's research functions. This Council must consist of not less than seven members appointed by the Minister who is required, in selecting members, to consult with the Rhodesia National Farmers' Union and such other producers' associations as he may recognise. Representation on Council includes the Rhodesia National Farmers' Union, the University of Rhodesia, the Associated Chambers of Commerce of Rhodesia and the Association of Rhodesian Industries, the Ministry of Agriculture and the Tobacco Research Board.

This was followed in April, 1971, by the Agricultural Finance Corporation which took over the existing functions of the Land and Agricultural Bank of Southern Rhodesia and the Agricultural Assistance Board. It is intended that all Government financial assistance for agriculture, other than that in the Tribal Trust Lands should be provided through the medium of the Agricultural Finance Corporation. To this end, the Farm Irrigation Fund, Agricultural Diversification Scheme, Tenant Farming Scheme, Coffee Scheme and Landowners' Development Loans Scheme were transferred to the Corporation from July, 1971.When feasible, the servicing of loans to Purchase Land farmers, presently handled by the Ministry of Internal Affairs through the Agricultral Loan Fund, will also become the responsibility of the Corporation. The Board, of not less than six members, is appointed by the Minister.

Finally, to complete the co-ordination, the Agricultural Development Authority was brought into being in July, 1971, with the members of its board forming also the boards of the Sabi-Limpopo Authority and Agricultural Land Settlement. This board's functions are to plan, co-ordinate and implement agricultural development, including the implementation of schemes for the betterment of agriculture in any part of Rhodesia other than Tribal Trust Land, forest land, National Parks and Wild Life land. The board is appointed by the Minister after consultation with the recognised producer associations and must have not less than five members.

Staff

Throughout the year, the staff of the Ministry of Agriculture has given of its best. Particular mention must be made of those in the field. Demands on their services have been heavy and continuous. I am proud to acknowledge their willing response.

Turnover of personnel continued to be uncomfortably high but improved conditions of service will, it is hoped, reduce this. Certainly interest shown by those about to leave Universities gives reason for some optimism.

Acknowledgements

The Ministry continued to receive the full co-operation and assistance of other Ministries and from the Statutory organisations and it is particularly gratifying to be able to acknowledge this with full sincerity. I would single out the Rhodesia Railways for particular mention. In spite of tremendous problems, the service given to the agricultural industry has been of the highest order and the benefit has been felt by every farmer in the country.

R. A. GRIFFITH,
Secretary for Agriculture.

The Economics and Markets Branch Report

for the year ending 30th September, 1971

General

Over the sixties decade the structure and function of the Branch has changed noticeably. In the early years of the sixties the Branch withdrew from administrative duties and concentrated more on research into the economic aspects of agricultural policy. An expansion of staff enabled field investigations to be undertaken. Initially, these field surveys were directed into individual commodity studies. Indeed it was from finance provided by the Rhodesia Tobacco Association that the Branch was able to expand considerably in order to conduct production cost surveys on tobacco. With the build up of staff and expertise in the mid sixties the approach to this type of research was changed to embrace whole farm performance rather than individual farm enterprise performance. From these Farm Management Surveys it has been possible to examine in detail the financial results of farming operations with a view to improving the overall performance. Valuable ancillary information on physical inputs, individual commodities and specific farming areas has also been forthcoming which has useful applications in development planning. Unfortunately the growth in this side of the Branch's work has coincided with a loss of staff and expertise in the latter part of the decade. However with the setting up of the Agricultural Marketing Authority in 1967 the marketing research and marketing policy side of the Branch's activities declined. The emphasis of the Branch's operations is now orientated towards production economics.

Farm Management Research Section

Increasing commitments to farmers wishing to participate in the section's recording scheme necessitated the services of an additional professional officer. This section has a staff of 5 professional officers and 5 analysts, and relies heavily during the vacations on university students. Early in the year under review one professional officer resigned and his replacement died shortly after assuming duty. It was not possible to bring the section up to strength until the end of the year. This has caused serious problems since not only is there a delay in providing results but the delay tends to discourage the farmer participants in the scheme.

For the 1965–66 season, 49 farming enterprises recorded data for the section. In 1969–70 this had built up to 110 and in 1970–71 it is probable that 125 enterprises will have recorded data suitable for processing. For 1971–72, 169 farmers have expressed their desire to participate in the scheme. The original concept was to accommodate a sample consisting of 5 per cent. of the European farming population. However the staff position has been such that it has been necessary to reduce this by half. The need to have a representative sample of the farming industry must be tempered to the ability of the Branch to undertake the work.

The Fifth Annual Report of Farm Management Data covering the 1969–70 year was published in May. In addition some 27 Discussion Group results were compiled. A booklet entitled "Physical and Financial Inputs by Operation employed in the production of Flue-Cured Tobacco, Maize and Cotton" was published. This represents some of the useful ancillary information which can be obtained from these surveys.

The Section arranged and presented three-day management courses for students at Gwebi and Chibero Agricultural Colleges. It liaised with the Rhodesia National Farmers' Union in delivering several one-day seminars. Lectures to Purchase Area farmers on record keeping were also given. The Section also assisted the Department of Conservation and Extension with certain in-service training lectures.

Development economics and policy

The Section responsible for this side of the Branch's functions suffered from an acute staff shortage at the beginning of the year. From a position of half strength a full complement of 6 professional officers has been built up, though military commitments have reduced the effective staff strength.

One economist in this section covers African Purchase Area and Tribal Area agriculture. A survey for the 1970–71 season has been concluded for Zowa and Chitomborgwizi Purchase Areas with emphasis on identifying reasons for low output. At the request of the Ministry of Internal Affairs an investigation was undertaken on five African irrigation schemes in the Midlands Province and Victoria Province. An examination was made of the financial implications of introducing mechanical draught to the Copper Queen Purchase Area as a means of combating the tsetse fly menace.

During the year a beef survey was undertaken in conjunction with the Rhodesia National Farmers' Union. A considerable amount of analysis will be required before its completion. An exercise examining the financial consequences of farmers who secured Farm Irrigation Fund loans has been brought to a pre-publishing stage. A

study to determine the capital requirements for coffee settlement has been completed. In addition the staff have been called upon to provide reports on a considerable number of irrigation projects. This section has participated in numerous committees ranging from irrigation to metrication. It also lectures to students at the Gwebi Agricultural College.

Supply and Trade Section

This section has a staff of one professional officer, together with a temporary officer. The section is responsible for matters related to the supply of agricultural input items such as fertilizer, labour, foreign currency control and numerous other agricultural input factors. It also provides the Ministry's liaison with organisations concerned with the transportation of agricultural commodities, the forecasting of production, agricultural trade and agricultural input items. The publication of the bi-annual Economics and Markets Report is the responsibility of this section.

Visits

In July Mr. P. W. Murphy, Senior Agricultural Economist, took the opportunity whilst overseas to attend the First International Congress of Farm Management held at Warwick University. A representative of the Branch attended the Annual Conference of the Agricultural Economic Society of South Africa held in Pretoria in October.

Staff

At the beginning of the year, 8 professional posts were held against an establishment of 14. Two bonded graduates joined the Branch in January together with a further replacement.

Unfortunately one of the bonded graduates, Mr. Ward, died in April. A further replacement was secured enabling the Branch to reach a complement of 11. One post was surrendered during the year and by September two overseas recruits had been secured to bring the staff up to its full strength of 13. Following the transfer of the Chief Agricultural Economist to Under-Secretary, Economics and Markets a new Branch head was appointed in November.

It is necessary to stress the desirability of creating conditions conducive to the retention of staff. Although it may be possible to secure replacements, such replacements are invariably recently qualified graduates who appear to remain with the Branch for a limited period during which time they are trained and develop a level of expertise. When they depart it is this expertise that is lost to the service. Over the decade the average years service per officer with the Branch has declined from 6 years in the first 3 years of the decade to 2½ years in 1971. Admittedly the staff was smaller in the early 60's but even in the mid 60's average years service per officer was roughly 4 years.

Acknowledgements

Acknowledgements are due to the large number of farmers who assisted the Branch, during the year. Co-operation and assistance was willingly given by other branches and departments of this Ministry and many other Ministries, all have contributed in some way to the successful operations of this Branch.

W. V. LACEY,
Chief Agricultural Economist.

Land Settlement Branch Report

for the period 1st October, 1970 to 30th September, 1971

A STATEMENT of land settlement policy was approved on the 24th November, 1970 and was published in the report of the Agricultural Land Settlement Board for 1970. Its main feature is that State land is required to be considered in the first instance for the restoration of viability to adjacent uneconomic units rather than for new settlement.

Proposed allocations, of European land in particular, have proved so controversial when advertised for objections that progress in allocating land has been retarded.

The Agricultural Land Settlement Board was reconstituted from the 1st July, 1971, when the Agricultural Development Authority Act No. 4 of 1971, brought into effect an amendment to the Agricultural Land Settlement Act, No. 59 of 1969. Since then, the Board has consisted of those persons who constitute the board of the Agricultural Development Authority, but the two boards function and are serviced separately in terms of their respective legislation.

Staff

Staff turnover in the recruiting grades continued at high levels of 60 per cent. in administrative posts, 100 per cent. amongst registry and typing staff, and 15 per cent. in the inspectorate. Officers of the rank of administrative officer and above, however, remained with the Branch throughout the year.

Land administration

The State land with which the Branch is directly concerned is that which is released by the Ministry of Lands for alienation under land settlement conditions. Other state land is reserved for investigation into its suitability for land settlement purposes, but remains the responsibility of the Ministry of Lands until it is released.

Land administration is summarised in an appendix. Boundaries within some 20 665 hectares were provisionally demarcated, preparatory to instructing final survey.

Lease administration

The following summarises lease administration during the year:

	European	*African*	*Total*
Leases issued	38	6	44
Leases renewed with option to purchase	62	751	813
Leases renewed without option to purchase	9	458	467
Leases cancelled or relinquished	3	90	93
Deeds of Grant authorized	28	891	919
Deeds of Grant issued (by Ministry of Lands)	71	834	904
Cessions of Leases	7	16	23
Successions to Leases	—	34	34

124 and 3 292 inspections were made of European and African Purchase leasehold farms respectively during the year.

African Purchase Land development

The Branch continued to disburse funds for the development and maintenance of communal requirements in roads, water supplies and dips in those divisions of African Purchase Land where Government's obligations for their initial provision have not been fulfilled, or where administrative requirements must be met despite there being no local government organization capable of assuming responsibility for them. Funds disbursed totalled $238 000 in the 1970–71 financial year as compared with $187 000 in the previous year. The demand for road improvements is often from outside the area served by them and for non-farming purposes. When such demands have to be met this can only be done to the detriment of requirements elsewhere.

The consolidation with adjacent farms of riverine and other reservations that are not required for the communal purposes for which they were originally reserved, was started in July, 1971. Such reservations are commonly abused as they are the individual responsibility of no-one. Depending on the availability of funds it is hoped to continue this exercise to its completion in some five to ten years time.

Wengi Proving Unit

The unit, which was established in 1966 on a trading account basis to test the practical development of an intensive irrigation farm, enjoyed a successful fifth year to the extent that $5 000 of its original capital can be repaid. A revised contract was negotiated with its manager on account of the original Wengi settlement project having been abandoned.

Tenant farming scheme

This scheme provided that lessees of private land could apply for a Government guarantee of credit advanced by the Land and Agricultural Bank, and was suspended early in 1970.

Those in the scheme in 1969–70 remained eligible for continued assistance, but were advised in January, 1971, that the scheme would be terminated at the end of the 1972–1973 season. When the Agricultural Finance Corporation came into being on the 1st April, 1971, the Corporation took over the processing of applications which, since the abolition of the Rural Land Board, had been undertaken by officials.

Those continuing in the scheme for 1971–1972 number 13, as compared with 31 at the beginning of the 1970–1971 season.

Deferred purchase scheme

The following farms were purchased by the Ministry of Lands for leasing as State land to applicants qualified under the Tenant Farming Scheme:

Farm	*I.C.A.*	*Hectares*	*Price*
Lot 2 of Kennilworth Estates	Angwa South	647,497 6	$35 000
Impala Downs	Doma	1 046,230 2	$40 000
Innesfree	Doma	1 550,924 0	$40 000
Chelvey/Bendridge Gate	Bindura	2 727,477 5	$40 000
R/E of Newbyth Ridge	Centenary East	818,800 8	$32 000
The Meadows	Marodzi/Tatagura	1 141,935 3	$46 500
Totals for six farms:		7 932,865 4	$233 500

The rental charged for Deferred Purchase Scheme farms is calculated to redeem the cost of acquisition by Government at 7½ per cent. interest over 20 years.

The scheme has been continued solely on account of its relationship to the Tenant Farming Scheme and will end simultaneously. Its usefulness in assisting former tenant farmers to become land-owning farmers has been very limited, since applicants and the farms for which they apply must both fulfil numerous conditions and the outcome of an application must depend on the availability of funds on which no assurance can be given in advance.

Acknowledgements

The Branch is indebted to several departments of the Ministry, especially the Department of Conservation and Extension, and to several ministries, especially the Ministry of Lands and the Ministry of Internal Affairs, for invaluable assistance during the year.

I am grateful to my staff for their loyal support and devotion to duty.

G. B. THORPE,
Under Secretary,
Agricultural Land Settlement.

APPENDIX

State Land administered by the Branch of Agricultural Land Settlement during the year ended 30th September, 1971	European		African	
	No. of units*	Hectares (approx.)	No. of units*	Hectares (approx.)
A. LAND HELD UNDER LEASE				
Land held under lease as at 30–9–70	456	980 837	5 230†	612 163
Land leased during the year	38	53 431	6	1 100
Sub total	494	1 034 268	5 236	613 263
Less: (i) Cancellations and Relinquishments of Leases during the year	3	2 455	90	12 190
(ii) Titles issued during the year	71	161 505	834	69 045
Total land held under lease at the end of the year	420	870 308	4 312	532 028
B. LAND HELD UNDER OFFER				
Land held under offer as at 30–9–70	52	72 223	153	36 935
Land allocated during the year	22	18 618	54	9 762
Sub total	74	90 481	207	46 697
Less: (i) Land leased during the year	38	53 431	6	1 100
(ii) Offers withdrawn during the year	1	1 400	5	1 534
Total land held under offer at the end of the year	35	36 010	196	44 063
C. VACANT LAND FOR SETTLEMENT				
Vacant land as at the 30–9–70	29	46 547	573	135 657
Land released by Ministry of Lands for settlement during the year	14	14 503	1	46
Cancellations and relinquishments of leases	3	2 455	90	12 190
Withdrawal of offers	1	1 400	5	1 534
Sub total	47	64 905	669	149 427
Less: (i) Land allocated during the year	22	18 618	54	9 762
(ii) Land withdrawn from settlement	—	—	—	—
Total vacant land as at the end of the year	25	46 287	615	139 665
GRAND TOTAL FOR LAND ADMINISTERED BY THE BRANCH AS AT THE 30–9–71	480	952 605	5 123	715 756

* Units include all pieces of land leased separately, both farms and extensions.
† Including agreements of purchase.

Annual Report
Central Library—Ministry of Agriculture
for the year ending 30th September, 1971

THE Library can report very substantial increases in the use made of it during the past year, by the Departments of Research and Specialist Services, Conservation and Extension and Veterinary Services. In addition to the total of 2 429 requests received by the Microfiche/Photocopy Service, the staff has dealt with an average of 965 queries and nearly 400 visitors per month (from the general public and Ministry combined).

Once again the library has to record its thanks to the many libraries in Rhodesia, South Africa, and throughout the world who have made it possible to supply so many of these papers. There have been a number of requests from all over the world for reprints and information from local publications which is an encouraging sign that our journals are making their reputations in fresh fields and that existence of the Central Library is being recognised.

There have been a number of new exchange agreements between the Rhodesia Agricultural Journal, the Rhodesian Journal of Agricultural Research and the journals of other organizations in the Argentine, Australia, Bulgaria, France, Holland, India, Italy (UNESCO), Japan, Philippines, Switzerland, Thailand (F.A.O.), United Kingdom and U.S.A. Besides promoting our journals and securing a number of desirable publications for the library and other departments at minimum cost, these exchanges have the added usefulness of making easier the acquisition of obscure requests, as not only will the organizations concerned in the exchange supply reprints of their own publications but are usually most co-operative over obtaining others from different sources within their own country, usually without charge.

The library has continued to order and supervise the delivery of 440 journal subscriptions for the various Departments of the Ministry, which supervision includes the onward transmission of invoices, chasing of non-arrivals and other queries. The library is in the process of compiling a Union catalogue of the journals held throughout the Ministry. This exercise has revealed a wealth of hitherto unsuspected material.

As the result of the circulation of the "Journals and Periodicals Publications List", last year, there has been a re-organization of the journal circulation and the demand has been such that there are now 67 journals on the Contents List circulation. The appreciation and use made of this service is most gratifying.

The re-organization of the library continues and now all journals have been classified and shelved in that order, with a catalogue of the library's holdings in alphabetical order to act as a guide. The cataloguing of pamphlets continues and those received but uncatalogued are filed in alphabetical order of author. Lists of books accessioned are circulated periodically as pressure of work allows, alerting officers to material obtainable within the Ministry and forming a reference catalogue for their future use.

The first of what is hoped will be a series of bibliographies has been compiled—in this case the subject being—Tea Cultivation.

During the year the assistance of the Librarian in the re-organization of their libraries has been requested by Chiredzi Experiment Station, Salisbury Research Station, the Herbarium and Matopos Research Station.

JEAN MAINWARING,
Librarian.

Annual Report of the Director of Research and Specialist Services

for the year ending 30th September, 1971

CLIMATICALLY the seasons, summer and winter, were favourable for high levels of production at most research sites. The winter in the Lowveld was particularly favourable and wheat yields were well above normal.

An event of concern was the invasion of the Lowveld from the south east by migratory locusts; although this was promptly and effectively dealt with, invasions next year can be expected since breeding sites are not known.

International Scientific Conferences in which the Staff of the Department participated during the year included the Second Rhodesian Science Congress in Umtali, the International Seed Testing Association Congress in Washington, D.C., the British Weed Control Conference in England and the International Soil Science Congress in Israel. In addition, the technical and scientific societies such as the South African Grasslands, Animal Production and Soil Science Societies and the Rhodesia Crop Science Society were supported. The Department's staff made important contributions to the activities of a number of S.A.R.C.C.U.S. Standing Committees including the attendance at meetings in Malawi, Angola, Moçambique and South Africa. It is hoped the sudden and serious restriction imposed on over-border travel this year for the first time will soon be lifted because it seriously inhibits effective progress in research.

Staff of the Department made a number of contributions to scientific journals during the year as well as publishing many advisory papers; these are listed in the full reports from the Department's Branches, Stations and Colleges.

A number of staff members are to be congratulated on the award of higher degrees during the year, including Messrs. Cowan and Herrington who received Doctorates, Mr. Franklin and Miss Connel who received Masters' degrees.

Senior appointments in the Department included Mr. H. K. Ward and Mr. R. N. Graham as Officers in Charge, at Matopos and Salisbury Research Stations, respectively.

During the year the Department lost 19 professional and 32 technical personnel through resignation and transfer while it recruited 22 and 37 respectively.

Mr. C. N. Hayter retired from the post of Chief Horticulturist after 25 years of valuable services to the Department.

The Department's major development projects during the year were the completion of the new Cotton Pest Research Laboratories at Gatooma Research Station and satisfactory progress with the Gwebi College Lecture theatre, the automatic rainshelters on Salisbury Research Station and the development of the Nuanetsi Experiment Station. Work was started on the extensions to the Herbarium while the five year development programme for Lowveld Research Stations entered its final phases. In December, 1970, the Head Office and certain Branches of the Department moved into new offices on Salisbury Research Station resulting in considerable economies and increased efficiency of administration.

New legislation introduced during the year and for which the Department has responsibilities included the new Locust Bill and the Seeds Act. Regulations were also brought in to control coffee diseases and necrotic Y virus in potatoes.

The Agricultural Research Council of Rhodesia came into being on the 2nd January, 1971, and the Department immediately became committed to a considerable amount of work on its behalf since the Council is not yet in a position to employ staff. A number of senior members of the Department have taken on additional duties, particularly on Committees and of a consultative nature, to ensure that the Agricultural Research Council can function effectively as a co-ordinating and advisory body. The Department has also provided the office accommodation and meeting space required by Council.

The Department's various Research Liaison Committees continued their valuable work during the year and, again under the influence of the A.R.C., some of them were altered in composition to improve their representation and to make them suitable for their new and additional role of advisors to the A.R.C. of commodity research needs.

After some years of concern over the "communications gap" between Research and the Farmer, there are signs that it is closing and the main factors involved are the welcome policy decision by our sister Department of Conservation and Extension that Extension Specialists are to be appointed to Research Stations to work on commodity lines and the existence of the Agricultural Research Council with its strong "Commodity" operational bias.

I acknowledge with gratitude the loyalty and competence of all members of staff during the year.

BRANCH OF ANIMAL PRODUCTION

Although the past season was favourable in the traditional cropping areas resulting in record maize crops, in Matabeleland the rains were delayed until late December and ended at the end of January. As a result ranchers, particularly in the western areas, had another very difficult year but managed to get through without Government assistance, an objective they had set themselves. In contrast Beitbridge district, which had freak rains in May, had a relatively good season.

The beef industry

Over the past year the number of beef cattle on European farms increased by 11 per cent. to 2 391 434 head at the end of 1970. Over the same period the total number of African-owned cattle increased by over 5 per cent.

In last year's report strong doubts were expressed whether, without overstocking, the beef cattle production of the country can be increased to much in excess of 5½m. head. This figure has now almost been reached and has been accompanied by a sharp drop in the demand for and the price of breeder and weaner cattle.

To assist producers of store cattle to change their systems of production, finance was made available to producers of young stock through the Cold Storage Commission's Cattle Scheme from 15-9-71 to 15-1-72. This was limited to 65 per cent. of the Commission's normal maximum finance levels and applied only to females with not more than two permanent incisors and milk tooth males which normally would have qualified for the Commission's support-prices.

Basically, however, the problem seems to be not so much one of inadequate finance, but one of how farmers, particularly in the marginal areas can, at existing beef prices, be kept on small farms which are naturally only suited to extensive systems of cattle rearing.

Similarly, in the cropping areas, producers are beginning to question the value of livestock on small farms and as mentioned last year it is obvious that in future increasing emphasis will have to be placed in our research programmes on the economics of different systems of production.

Beef production research

At Matopos the study of genotype-environment interaction in beef cattle has been in progress for 13 years and despite persistent droughts during the last eight years, fertility of both supplemented and non-supplemented cows remained remarkably high, being on average 81,8 and 68,3 per cent., respectively, from 1958–1970. Both groups raised 95 per cent. of their progeny to weaning at nine months, but from then until the age of 2½ years, three per cent. more deaths occurred amongst young stock not fed protein supplements in winter than amongst their fed counterparts.

During the year attention was given to the question of size of cow which is of considerable importance in deciding the amount of additional feed, largely energy, required to support heavier cows which, in turn, produce heavier calves.

At Henderson investigations were undertaken to define the optimal amount of supplementary protein to feed young cattle on veld grazing in winter and also measurements of changes in efficiency (both energetic and economic) of steers during intensive fattening. In both cases, data have been obtained to which cost factors may be applied to fit a wide variety of economic circumstances.

The effects of dietary characteristics on body composition of cattle continues to be an active field of research by the Animal Nutrition Section of this Station. It has been found that the body composition of both cattle (and sheep) is very resistant to change from normal, even when extreme dietary treatments are imposed.

Makoholi continued work on phosphorus supplementation. Heifers fed bone meal as a veld supplement from weaning show superior nursing abilities in successive lactations. Weaner production among supplemented animals continues to be maintained at 20 per cent. above that of their controls.

In a trial examining the feasibility of increasing lifetime productivity by first mating heifers at fifteen months, the conception percentage in the second year dropped to about half that of their control counterparts who were first mated at twenty-seven months. Furthermore, in the same trial calves that were creep-fed prior to weaning showed no weight advantage over calves where the supplement was fed direct to the dams.

At Tjolotjo Experiment Station the work to determine to what extent production in the indigenous stock can be improved through selection, under fluctuating conditions of nutrition is beginning to show encouraging results in that some twenty-five farmers are, under similar conditions, improving production by straightforward selection instead of haphazard crossbreeding.

The dairy industry

Owing to a good season in Mashonaland supplies of whole milk to the Dairy Marketing Board increased by 8,1 per cent., most of the increase being attributed to Mashonaland suppliers consigning to Salisbury Dairy. Over half

of the total quantity of milk consigned to the Dairy Marketing Board was received at this centre.

Butterfat intake from cream supplies continued to decline, and intake was 13,6 per cent. less than in the previous year. This trend is expected to continue as the sale of whole milk is found to be more rewarding.

The importance of cleanliness in milk production has been emphasised by the Dairy Branch and during the past year the average bonus paid to producers increased from 1,50 cents per gallon in 1969–1970 to 1,52 in the year under review (about 0,325 cents per kg). This bonus is determined on the basis of hygiene and compositional quality tests, which are carried out twice monthly on each supplier's milk deliveries.

The average price paid to the milk producer during the current year was 28,71 cents per gallon which with the addition of quality premium gave a total average realization of 30,23 cents per gallon. This was an improvement of 1,07 cents per gallon over 1969–70.

The price paid to the producer depends very largely on the volume of intake disposed of as whole milk and other high realization outlets. During the year under review 40,3 per cent. of intake was sold as whole milk, leaving 59,7 per cent. for manufacturing purposes. Sales of whole milk were actually 6,6 per cent. above those of 1969–70 and a feature of note was the 9,5 per cent. increase in the African market. Improved sales and increase in price of milk from 9 pence per pint to 8 cents per pint contributed substantially to the producer price increase.

Sales of all other dairy products continued to show an upward trend; the popularity of yoghurt, reported on last year, continued with fruit flavoured types in greatest demand.

Cheddar cheese quality was well maintained, and 95,2 per cent, qualified for first grade quality. New varieties namely "Komyn" and "Edam" were launched but it is too early to assess public reaction. Experience in the past indicates that new varieties promote sales but have little impact on established varieties Cheddar and Gouda.

The quality of butterfat used for butter manufacture appears to be at the same level as in 1969–70, and 91,5 per cent. was manufactured into first grade butter.

An indication of the quality of the Dairy Marketing Board's products is again evident from continued success at the Rand Easter Show. In the cheese, butter and milk powder entries no less than 29 prizes were gained of which 10 were first prize awards. Two exhibits succeeded in gaining Gold Medals, and the coveted Weddel Perpetual Trophy for the best Export Cheddar Cheese was retained in Rhodesia. These successes are a further indication of the value of maintaining a high standard of hygiene and quality production.

In so far as the Milk Recording Scheme is concerned 142 producers continued to take advantage of this service. 11 129 completed lactations were recorded, giving an average lactation yield for all breeds of 3 696 kg per cow. This represents an increase of 46,72 kg over the 1969–70 season. A feature of note was the success of Mr. H. H. Evans' herd in the Milking Competition Section A for milk production, where the average yield per cow for the best 15 animals in the herd was 9 765,8 kg. This established a new record for this competition. Runner up in the competition was Madrian (Pvt.) Limited, who also succeeded in winning the Butterfat Section of the Milking Competition. Their best 15 cows averaged a production of 318,42 kg of butterfat per cow.

Dairy research

At Henderson Research Station chemical analyses were made of the complete carcasses of dairy calves, to determine the energy retention from different rations.

Formulation of suitable diets, from locally available foods, is now possible.

The sheep industry

The latest available statistics show that while the number of European-owned sheep dropped from 362 876 in 1969 to 349 009 in 1970, African sheep number increased from 376 953 to 431 110. This drop in European sheep production may be expected to continue as more and more farmers in Mashonaland are beginning to realise that these areas are not particularly well suited to the rearing of sheep.

To encourage production the Cold Storage Commission increased the producer price of lamb by an average of 3 c per kg during the course of the year. These prices are only maintained by import control and should this be lifted only farmers using the most economic methods of production can hope to survive. Care must also be taken that sheep production is not encouraged, by high prices, in areas not naturally suitable to the rearing of sheep.

Sheep research

Results of work carried out at Matopos Research Station show that, owing to high feed costs, imported breeds of sheep may be less profitable in the dry areas than Black Head Persian types, despite the poor mutton quality of the latter.

In this connexion, veld reared lambs of Black Head Persian ewes were heavier at weaning than those of Dorper ewes, but the reverse was true when supplements were supplied.

In studies on the synchronisation of oestrus, ewes were brought to ovulate within two days after the removal of medroxyprogesterone acetate-containing tampons. Seventy per cent. of ewes conceived on first oestrus and a further 20 per cent. conceived on second oestrus following removal of the sponges.

The Grasslands Research Station's demonstration sheep unit in its second year gave disappointing results, lamb mortality was exceptionally high, liveweight gains were poor, wool yields were low and deaths amongst ewes were common.

The system of production has now been revised with the flock and lactating ewes receiving concentrate supplementation during the winter months and so far the response to this change is satisfactory.

An investigation, at the same station, of the effects of parasitism on sheep production indicated that at a low level of parasite infestation there was no effect on the liveweight gains of lambs but protein digestibility of the feed was significantly depressed by increasing levels of infestation. Carcass composition, which was a function of body weight, was not affected by level of feed nor by degree of infestation and on examination of the gastrointestinal tracts, it was found that the animals had largely eliminated the parasite infestation.

Sheep work at Henderson Research Station was concerned with the problems of goitre in Autumn-born lambs. It is now known that the condition is associated with low serum protein-bound iodine levels in pregnant ewes, and histological examination of the thyroid glands of affected lambs has shown pronounced hyperplasia. Analyses of various commonly-grown pasture grasses have revealed marginally low iodine contents while levels of cyanogenetic glucosides, especially in Star grass, are high. Thiocyanates are known to be goitrogenous and the two factors (low dietary iodine and the presence of goitrogens) are most probably the cause of the disease. The provision of a simple iodised salt lick was found to be effective in preventing the develpmento of goitre.

The pig industry

Following the withdrawal of the Government minimum pig prices and the introduction of the quota system, the number of European-owned pigs showed an appreciable drop during the past 12 months.

On the other hand, except for a noticeable improvement in the number of African producers, producing quality pigs, African pig production has remain fairly static during the past few years.

The poultry industry

Two years of negotiation, referenda and legislation culminated in the acceptance in principle of a poultry levy on day old chicks.

By proper utilization of this fund it should be possible to develop the poultry industry along economically sound lines.

In this connexion, new and improved poultry regulations are in preparation and should be promulgated next year.

Product prices remained stable during the year. With a large increase in broiler sales, meat price has remained low. Whilst the mean Salisbury egg prices were marginally lower than last year, national supplies have increased by 15 per cent. and the range of price fluctuation has narrowed considerably.

Poultry research

Small trials were conducted on duckling production and "layer-type" broiler cocks and a feeding trial for layers is underway. The experimental controlled environment house has been planned and the materials and a portable building obtained. Complete reorganization of the research facilities is almost complete.

Work with ducks in relation to public health continues, with the co-operation of the Department of Veterinary Services and the Ministry of Health.

BRANCH OF BOTANY AND ECOLOGY

Satisfactory progress is being made at Matopos Research Station and Nyamandhlovu Experiment Station in work designed to establish the most efficient grazing procedures on veld. Emphasis is placed on multi-paddock grazing systems and the programme comprises four grazing trials covering a range of grazing procedures, as well as more detailed studies of the patterns of growth and reaction to defoliation of individual grasses or veld communities.

On sensitive thornveld on red soils it has been found that, even with a maximum period-of-stay of two weeks and rest periods of 22 weeks, stocking at too high a rate will result in severe damage to the veld. Where veld is stocked at moderate rates there appears to be no advantage, in terms of cattle production, of using a short-duration grazing system with sixteen paddocks per herd as compared to a split-season grazing system involving four paddocks per herd. However, it is as

yet too early to establish the long-term effects of these grazing systems on the veld.

In pot trials with the common spear grass (*Heteropogon contortus*) it was shown that frequent defoliation of this grass does not result in loss of vigour unless defoliation is severe. For example, cutting weekly for a period of three months at a height of 120 mm reduced root growth by only 9 per cent. as compared with the unclipped control; however, weekly cutting at a height of 40 mm reduced root growth by 69 per cent.

Measurements of the botanical composition of the veld in the grazing trial at Charter Estate indicate that none of the grazing treatments applied has resulted in a change in botanical composition.

Severe denudation of veld in Matabeleland by Harvester termites (*Hodotermes mosambicus*) was reported during the dry season of 1970, and damage appears to be more severe and more widespread in 1971. On the more sensitive soil types, in particular, such as Thornveld on red soils, the combined effects of eight consecutive years of subnormal rainfall, grazing pressure, and the depredations of Harvester termites have been devastating, and large areas are in a severely degraded condition. Even with good management it will be many years before such veld can be fully restored. A start has been made in research on the biology and control of Harvester termites and an entomologist has been posted on secondment to Matopos Research Station.

Very encouraging progress is being made by the staff of Grasslands Research Station in research aimed at introducing selected pasture legumes into veld.

Selected pasture Legumes were established during the year at six different research stations which provide a wide range of ecological conditions. *Stylosanthes* spp. have proved their ability, beyond all other species so far tried, to establish after limited soil cultivation and under dry conditions. From results obtained in Australia and elsewhere in the world it is clear that the successful introduction of pasture legumes into veld in the medium and high rainfall areas of Rhodesia would have an impact on livestock production which would be little short of revolutionary.

Nuanetsi Experiment Station

Agreement to lease for 20 years, 5 774 hectares of Nuanetsi Ranch Ltd., for the purpose of establishing an experiment station dates from 1st October, 1970, and development was started during the past year. Two dwellings are nearing completion, one farm building has been completed, domestic water supply has been installed and some roads and fences have been constructed.

Pasture seed

Sales of pasture seed, registered and unregistered, through the Salisbury Farmers Co-op., official agents to the Rhodesia Pasture Seed Growers Association, for the season ending 31st March, 1970, were 55 per cent. up on those for the previous season, totalling 31 799 kg.

The most important contributors to this total were:

Katambora Rhodes Grass, 16 562 kg, Love Grass, 7 927 kg, Giant Rhodes Grass, 7 361 kg, *Paspalum notatum*, 2 280 kg, *Paspalum guenoarum*, 1 769 kg and Sabi Panicum, 836 kg.

Herbarium and National Botanic Garden

Herbarium

Accessions to the National Herbarium totalled 6 408 for the year.

Co-operation with the University of Coimbra, the Centre Botanico, Lisbon, Kew and the British Museum continued in connexion with the Flora Zambesiaca. Vol. III, Part 1, the *Mimosoideae* prepared by Mr. J. F. M. Brenan of Kew and a volume on the *Pteridodphyta* prepared by Dr. E. A. Schelpe of Cape Town were published during the year.

A new and enlarged edition of Wild's Botanical Dictionary of Native and English Plant Names by H. M. Biegel and S. Mavi has been completed and will be published in the first half of 1972.

Check lists of Rhodesian and Zambian Grasses by Mr. B. K. Simon have recently been published (Kirkia VIII (1)) and a check list of Rhodesian legumes by Mr. R. B. Drummond is in the press.

The check list of Rhodesian Trees and Shrubs is almost complete and will be published in 1972.

Considerable numbers of plant specimens were determined for various government departments and institutions in Rhodesia and in Botswana, Zambia, Malawi, Mozambique and Angola.

National Botanic Garden

Good progress has been made in the Botanic Garden. New areas have been made park-like by removal of rocks, filling in of old roads, levelling the ground and planting lawn. A further 450 trees were planted, mainly in the indigenous section; these include rare species, some of which are difficult to introduce.

In June, 1971, the combined oil industries donated $50 000 to the Botanic Garden. This major gift is greatly appreciated and will be used for water development (a lake, streams, sprinkler systems, etc.). Two boreholes have already been

drilled which will provide sufficient water for the schemes envisaged (23 m^3/hr.). An overall reticulation plan has been produced in conjunction with the Ministry of Water Development and a firm of water storage engineers is producing plans for the lake.

An important milestone in the history of the Botanic Garden was the formation during the year of a National Botanic Garden Fund Committee under the chairmanship of Sir Keith Acutt and it is hoped that this will give new impetus to garden development and to fund-raising for the remaining schemes.

Committees and general

Members of the Headquarters staff of the Branch served on a number of committees including two sub committees of S.A.R.C.C.U.S..

In collaboration with the Department of National Parks and Wild Life Conservation, much time has been devoted to the drafting of an Act for the conservation of the Flora and Vegetation.

Surveys have been undertaken for National Parks and other departments.

Enclosures to study the recovery of vegetation under the protection in the Tuli Hunting Area have been laid out but have not yet been fenced.

Lectures have been given to in-service training courses held by the Department of Conservation and Extension and to the Field Ecology Course of the University of Rhodesia.

BRANCH OF CROP PRODUCTION

Most research stations concerned with crop work experienced reasonable rainfall in the first part of the season, but in many cases rain later became sporadic and poorly distributed.

On Salisbury Research Station, although the rains ended somewhat early for an ideal season, conditions were generally good, although local storms did considerable damage to some trials.

Agronomy

Eighteen maize variety x plant population trials carried out throughout the country, by Salisbury Research Station, showed a negative correlation between variety maturity and plant population and demonstrated that R 200 can match SR 52 in yield, even at high yield levels, if grown at a sufficiently high population.

In variety trials conducted at Sabi and Chiredzi new single hybrids and three-way crosses performed well in relation to varieties of known yield potential and trials were conducted to study the tasseling and silking behaviour of four maize varieties in order to evaluate the synchronisation of receptive silks and pollen availability. Results served to explain differences in yield potential in terms of these factors.

A trial was conducted at Chiredzi to determine how late nitrogen applications could be successfully applied, and to study whether such applications had any effect on leaf area duration. There was a trend for yield to decrease as top-dressing was delayed, this being particularly severe when applied at the milk-dough stage.

In a planting date trial with SR 52 maize conducted at Grasslands Research Station, the highest yields (14,3 t/ha) were obtained from planting in August at a plant population of 70 000 plants/ha. In recent years symptoms of zinc deficiency have been noted in maize grown in land that has been cultivated and irrigated for eight or more years. A trial designed to investigate this problem has shown that the deficiency is best overcome by the placement of a zincated compound fertilizer in the planting hole rather than by banding it 100 to 120 mm from the maize row.

In two dryland long-term soil productivity trials, the yields of SR 52 were somewhat lower than usual because of the dry weather experienced after January but there was the usual satisfactory response to applications of compost.

Of particular interest in the plant arrangement and population studies of irrigated maize at Henderson Research Station, was the effect of square spacing on grain yield. Only with high plant populations, 56 000 plants per hectare or more, did square spacing appear to increase yields and then only marginally. In this experiment a record yield of 19,86 t/ha of grain was recorded from a plant population of 67 400 plants per hectare.

At Makoholi Experiment Station dry-land maize, water-planted in October yielded 8,118 t/ha compared with 4,050 t/ha when planted with the rains in mid-November.

In variety trials of sorghum and maize grown for grain, yields were average to high at all centres, except with sorghum at Makoholi. At both Matopos and Gatooma Research Stations sorghum outyielded maize, their respective yields being, at Gatooma 6,955 and 4,197 t/ha, and at Matopos 6,278 and 3,188 t/ha. Of the sorghums, NK 300A was out-yielded by Noorvaal at both centres and the maize varieties R.200 and G.S.60 performed well at all three sites despite the short season.

Sorghum forage variety trials were conducted on both clay and sandveld soils at Matopos giving similar results although the trial on sandveld outyielded that on clay. Also at Matopos water applied to a heavy clay in the dry season again increased sorghum yields where the crop was

planted with normal rainfall some months later. 101, 203 and 305 mm of water applied, increased yields by 28, 70 and 69 per cent. respectively. In addition, trials were conducted on Downy Mildew resistance among sorghum hybrids and on groundnut, soya bean and wheat varieties for the respective plant breeders.

In the Lowveld the main emphasis in wheat research lay with the breeding programme and the testing and screening of new varieties at all three lowveld stations. Results showed that Tokwe, Odzi and Devuli were the best of the recommended varieties for lowveld conditions. A satisfactory aspect of the variety trials was the good performance of many of the lowveld selections which were critically tested for the first time; seven of these either outyielded or performed as well as Tokwe.

Planting date studies were continued, and for the third successive year results showed that there was no advantage in planting late-maturing varieties early and *vice-versa*. The direct effects of planting date emphasised the need to plant during the first three weeks of May, and indicated that yields from later planted crops would be seriously reduced.

A series of nitrogen trials was conducted on all three lowveld research stations to determine nitrogen response characteristics following different crops on the different soil types. It was shown that nitrogen responses were independent of variety. Dwarf varieties that are immune to lodging do not respond to higher levels of nitrogen than the tall varieties that are susceptible to lodging. Work on time of application of nitrogen top-dressing showed that leaf area duration can be slightly improved by high levels of top-dressing at the early boot stage or later but that yield benefits are generally small or absent.

A range of spacings and seedrates were compared using varieties of different growth habit. Yield differences between treatments were small and varieties did not react differently to the population range studied.

Irrigation frequency trials were continued at Chiredzi and Chisumbanje using schedules based on plant development stages. Results confirmed those of previous seasons, showing that the method was both feasible and practicable.

Studies with wheat at Grasslands Research Station have indicated that, where frost is no serious problem on irrigated land at an altitude of more than 1 500 m, planting may be advanced to the last fortnight in April but, in other parts where frost is known to be severe, planting should take place about a month later so as to ensure that anthesis occurs in mid-August, by which time the most serious threat of frost is over.

Yields of wheat grown in the new irrigation block were greatly increased by the application of 90 to 135 kg P_2O_5/ha provided that 168 kg N/ha was also applied. At least half the total amount of nitrogen should be applied at time of sowing.

The programme of rice research at Chiredzi was intensified due to the failure of many of the trials during the previous season caused by blast disease. All trials were sprayed with Benlate as a blast control measure, and the disease did not attain serious proportions. Yields were generally high from all trials, and results led to a considerable advance in knowledge of agronomic factors associated with rice production in the Lowveld.

Quarantine facilities were provided for newly introduced varieties, of which several showed considerable promise. Variety trial results indicated that there were several varieties of better yield potential than the two available to growers at present.

Planting date studies showed the importance of planting by early November for best yield results. Due to problems associated with adverse weather during harvest, planting date should be geared to varietal maturity to ensure that the chances of rain during harvest are minimised.

Nitrogen studies showed that the level of nitrogen applied at planting was the most important single factor determining yield, and that the time of application of nitrogen was of less importance than the application of the correct amount.

Rice yields increased with decreasing seed rate, but row spacings within the range of 150 to 450 mm did not have any significant effect on yield. These results confirmed those recorded during the previous season, when similar trends were evident.

Irrigation frequency studies yielded valuable information, indicating that a frequent cycle of light irrigations was not necessary. Peak water consumption was attained about 70 days after planting, and there was no evidence of a decline in moisture usage during the grain maturation period as is the case with most other annual crops.

At Gatooma Research Station, in 1970–71 a start was made on physiological work with cotton in order to obtain a better understanding of the cotton plant. A growth analysis study of two varieties was conducted at four sites varying in altitude from 480 to 1 440 metres.

A series of trials on ratooned cotton was terminated and a lot of useful agronomic data has been accumulated. This knowledge will be stored and used as a baseline for future work should the entomological problems of ratoon cotton be overcome.

The work on nitrogen, time of planting and in-row spacing of irrigated cotton continued. A definite pattern of nitrogen responses is emerging but the effects of in-row spacing and time of planting are still very variable and a study of climatic data may assist in clarifying the picture. In the Lowveld the bulk of the cotton acreage was devoted to Cotton Pest Research trials at Chiredzi, and to variety trials at Sabi, both being conducted on behalf of Gatooma Research Station.

In the Lowveld the programme of work on cotton was restricted to investigations of a physiological nature designed to study factors associated with boll shedding. Several chemical growth regulants were compared and their effects on plant size and fruitfulness were recorded. Other trials involved studies on light profiles within the crop canopy, and the effects of artificial shading and leaf removal in relation to boll production and retention. The trials were of an exploratory nature, and results provided a clearer understanding of the problems involved.

Small responses to phosphate were recorded for the first time on the basalt at Chisumbanje, indicating that the soil is becoming marginally deficient in this nutrient after 17 years of cropping.

The programme of work on soya beans was, at Chiredzi, restricted to a single variety trial from which excellent yields were obtained and the continued success of variety Bragg has led to its release for commercial production.

Seed bean trials at Chisumbanje remained free of any serious diseases, but at Chiredzi results were affected by a serious and patchy outbreak of common blight and halo blight which affected the trial results to a greater or lesser extent.

The results of nitrogen trials confirmed those obtained in previous years, and indicated that the nitrogen requirement of the seed bean crop was high, at 135–170 kg/ha depending on soil type and previous crop. At Chisumbanje, differences in yield between spacing treatments were relatively small, but results pointed towards the desirability of closer spacings. In an irrigation trial on the basalt there were no significant differences between treatments in spite of large differences in irrigation frequency.

Weed research and work on growth regulators

At Henderson Research Station a major part of the agronomy programme was weed research with the emphasis on herbicide screening. This year more studies in weed biology and competition were done and in future more basic studies of this nature will be made, particularly with regard to herbicide behaviour, residues, leaching and breakdown.

Combinations and mixtures of herbicides used on soya beans and groundnuts were effective and provisional recommendations have been made for their use during the 1971–72 season.

In an attempt to reduce soil erosion, cotton was grown in untilled soil with herbicides used to control weeds. This was successful and these findings should be of particular benefit to growers on granite sandveld soils.

Irrigation agronomy included studies on plant arrangements of maize, cotton, soya beans and wheat. Under optimum moisture and soil fertility conditions growth regulators, which are a comparatively new field in agriculture, were tested on these crops. Results were variable and more investigations are planned in future.

At Gatooma a screening trial of possible growth regulators showed that only chlormequot (CCC) showed promise. A satisfactory reduction in height was obtained but this was often associated with a reduction in yield. It was also apparent that use of CCC increased the earliness of the crop.

Growth regulators were also used, in a preliminary study, at Chiredzi Research Station to determine their effect in reducing internode length in groundnuts; the main problem in groundnut production in the Lowveld being related to excessive vegetative growth and poor fruit set.

Crop ecology

The scope of crop ecology studies expanded with an increase in professional staff.

Last winter, studies with wheat showed that yield is limited in warm areas by a lowered number of spikelets per ear and a shorter leaf area duration. Studies were also conducted with different irrigation levels and plant populations to relate leaf area index to productivity.

In summer, studies with a number of maize varieties at different altitudes showed a very consistent ratio of time to mid-silk and time from mid-silk to maturity. Studies on the relationship of maize leaf area and yield gave a linear relationship up to a high Leaf Area Index of 9,0 demonstrating the need for considerable leaf area to achieve maximum productivity. Investigations into certain aspects of water planting showed maize seed of various sizes could emerge through as much as 250 mm of dry soil. Maize seed imbibed water more rapidly when soaked in water than when placed in wet soil and imbibition slowed down below 20°C. Short periods of wetting and drying were tolerated well but if initial wetting exceeded two days and subsequent drying seven days, viability was seriously impaired.

Growth studies were initiated with groundnuts and soya beans. Rates of growth and components

of yield were measured at different altitudes and problems relating to sample size when designing sampling procedures were studied.

Plant breeding

Maize

Based on Salisbury Research Station, maize breeding work was carried out on an increased scale in the Highveld in summer and in the Lowveld in Winter. This work included the production of new inbred lines, backcrossing to introduce desirable genes such as those for high lysine, *Helminthosporium turcicum* resistance and yellow endosperm colour, into present inbreds, and intercrossing within six composites of exotic strains. Work to produce versions of SR 52 with either high lysine or yellow endosperm is nearly completed and the development of composities is sufficiently advanced for a recurrent selection programme to start.

About 600 hybrids entered preliminary yields trials at Salisbury but all were seriously damaged by severe storms, emphasizing the value of testing at more than one site.

In 26 advanced variety trials, carried out throughout the country, the highest yielder was a three-way hybrid with similar maturity to R 200. Breeders' seed will be produced for commercial release in 1972–73 as will that of another promising three-way, with maturity intermediate between SR 52 and R 200.

Sorghum

The sorghum breeding programme at Gatooma made useful progress despite the lack of adequate irrigation and other facilities. In two trials of 289 experimental hybrids, highly significant differences in yield were observed. Twelve hybrids with suitable agronomic characteristics and a mean yield of 8,528 t/ha were selected for further testing. Various pollen parents were screened on their performance in hybrid combinations and a number were selected; the best combiners were from the Feterita and Angoni groups.

In the recurrent selection programme outcrossed seed was produced for seven recurrent selection populations. The second cycle of compositing was carried out for a population derived from Framida, Feterita and Red Swazi. Disease resistance work was limited to screening of material in the collection and newly introduced resistant material, for possible resistance to Downy Mildew.

Reselection was continued within 241/56 Red Swazi and 11/56 Feterita and sufficient seed was bulked for yield trails. Pedigree selection with the Feterita x Framida and Red Swazi x Framida series was carried through a further generation. The entire collection of introductions was grown in a nursery grouped so that selections could be made within similar material and duplicates eliminated. Selections were also made within introductions to improve uniformity.

Wheat

Wheat breeding was conducted by Salisbury Research Station, in both the Highveld and Lowveld, in the belief that specific selections must be made to suit the two different environments. The amount and scope of segregating material being grown at Salisbury was extended considerably which should provide much greater potential for selection in both regions from 1972–73 onwards.

Preliminary trials of promising selections were tested at the sites of selection while other varieties which had performed well in preliminary trials were tested at 16 sites throughout the country. Bulking of three promising varieties was started with a view to releasing them after the 1971 results have been analysed.

In summer an international rust nursery was assessed in collaboration with the Branch of Plant Protection and in winter an international yield nursery was grown. Both these nurseries can supply valuable parental material for the breeding programme.

Cotton

All introduced material for which there is no detailed information was planted at Gatooma and among these the Albacala selection showed promise of good quality and desirable plant habit but with a yield potential lower than Albar. The most promising varieties will be tested in Preliminary Variety trials next season.

A number of introduced varieties were tested in preliminary variety trials in various parts of the country, but none are likely to be possible replacements for the existing commercial varieties although some may be of value in the transfer programme. All available hybrids and hybrid selections were also planted at Gatooma and from this material 25 hybrids have been selected for further testing. A number of single and double crosses were made mainly to improve the agronomic and quality characters of Albar. A four way cross (Acala 4–42 x Albar 627) x (Deltapine S.L. x PD.2165) was used as the basis of a recurrent selection programme.

All trials planted as part of the progeny row selection programmes were successful. S65/279 was released as Albar breeder's seed for 1971 and shows considerable improvement over previous releases. The programme of selection within Deltapine S.L. continued with material reaching the District Variety trials stage. A number of selections from Deltapine 16 were fed into the bottom

of the programme while a number of selections from Del Cerro 153 and 169 have reached a final stage of testing and show promise as possible commercial releases. Early maturing varieties were tested in the marginal areas and once again none of them proved superior to Albar.

Soya bean

Soya bean breeding continued to expand. Thirty new crosses were made and segregating material was grown at Salisbury in summer and at Chiredzi in winter.

Some 1 200 single plant selections underwent their first examination at Salisbury and 245 lines were included in preliminary yield trials. An intermediate stage of testing of 49 promising lines was initiated at four sites and 16 named varieties and selections were tested in 11 advanced trials throughout the country. The results confirmed that Bragg is very productive under Lowveld conditions and seed of this variety is being bulked for commercial release.

Groundnuts

A groundnut breeding programme was initiated, the first crosses being made in summer. It is hoped to be able to grow two generations per year, using the Highveld in summer and Lowveld in winter. Investigations into techniques to make this possible were initiated.

Screening of introductions and selections continued but on a reduced scale. Preliminary yield trials on early and late maturing varieties were conducted at Salisbury and Trelawney. Two separate series of advanced trials for the two maturity groups were each conducted at nine sites and screening of Natal-type material continued at Makoholi. A restricted release of a promising late maturing variety was made to the Rhodesia Crops Seed Association.

Fungicide trials on irrigated groundnuts were carried out in collaboration with the Branch of Plant Protection to examine the effectiveness of chemicals in controlling Leaf Spot (*Cercospora spp.*) and to detect any differential response to Leaf Spot control amongst different varieties.

Potatoes

More extensive examination of new lines of potatoes bred in Rhodesia was initiated. Some 900 lines were examined at Salisbury and Inyanga and 70 of these having good characteristics have been retained for more critical evaluation.

The crossing programme continued with 30 new crosses being made and 27 new introductions potentially useful for commercial production and in the breeding programme, were imported.

Two summer variety trials were planted at Salisbury and one at Gatooma. The virtual absence of Late Blight resulted in high yields. One second irrigated variety trial was carried out at Salisbury.

Four hundred and fifty kg of virus tested seed produced at Inyanga was released to the Rhodesia Seed Potato Association.

Horticulture

Horticultural research at Henderson Research Station covered investigations into growing vegetables, deciduous fruits, strawberries and pyrethrum. Preliminary studies were carried out with growth regulators on vegetables with the object of controlling their size and improving uniformity and maturity for marketing purposes. More attention was paid this year to the effects of plant competition on growth and yield of vegetables.

In the deciduous fruit orchard there was an outbreak of pernicious scale and the opportunity was taken to test various insecticides to control it.

There is a growing interest in pyrethrum and because of this, investigations into growing this plant were intensified.

In the Lowveld a foundation planting of citrus stock was established as a basis for future experimental work on this crop. Rootstock and scion varieties were planted out from the nursery, as sources of seed for the planned long term variety/rootstock research programme.

The banana spacing and fertility trial continued to provide valuable information in regard to yield, flowering, leaf emergence and bunch characteristics. The growth of the avocado, mango, cashew, pecan, litchi, and macadamia trials progressed very favourably but the trees were all too young to start fruiting. Useful data and good yields were recorded from the papaw and granadilla observation plots.

After 12 months in the land, the grape vines had grown vigorously and fully covered the trellises. Certain varieties produced a crop in their first season of bearing, but bunch quality was poor.

Vegetable trials were confined to the winter season and no critical work was undertaken in summer due to unfavourable climatic conditions for economic vegetable production.

Spacing trials were conducted on onions and gem squash, and different levels of nitrogen and phosphate were compared on tomatoes. Yields from all these crops were excellent, and data was recorded on growth and quality characteristics.

Optimum spacings and planting dates were established for the onion crop.

At Rhodes' Inyanga Experiment Station rainfall 16 per cent. higher than the mean, was well distributed apart from a dry February, and 11 hail showers, none very severe, occurred during the season. The winter was the coldest since 1965 but an exceptionally warm August complemented these conditions, bringing apple blossoming forward by a week, and aggravating prolonged dormancy of leaf buds.

Most cultivars of all fruits cropped heavily, facilitating preliminary apple thinning studies on Chinemuri.

Beneficial effects of D-D fumigation on extension growth in the Apple Establishment Trial were less pronounced than in previous years, probably due to the heavy build-up of *Pratylenchus* in fumigated plots which was revealed by recent sampling.

Multiplication of nine apple rootstocks was accelerated for rootstock and other trials. Virus-free scion material of apple, cherry and peach cultivars was introduced from South Africa. A non-critical planting of four scion cultivars on seedling rootstock, hot-water treated to eliminate *Prtaylenchus*, was established for preliminary studies of seven intensive pruning systems.

Considerable development took place at Chipinga Experiment Station during the year. This included the completion of the new office block and laboratory and the provision of a direct telephone link to Chipinga exchange. A successful field day was held on 2nd April and attended by over 300 people, including members of the Agricultural Research Council.

It was, as foreshadowed in last year's report, unfortunately, necessary to uproot the coffee variety trial, on account of Fusarium bark disease but all other trials are making steady progress and response trends are emerging.

A collection of coffee cultivars is being established and will be added to as new material is released from quarantine. In addition, a quantity of seed covering a wide range of valuable genotypes was imported from Angola and is now in quarantine in Salisbury.

A new programme of physiological studies in coffee has been started; material in the New Management and in the Artificial Shade Trials is being used to study the development of both old and new growth to establish critical phases of development and treatment differences. A study of flowering in both Chipinga and the Vumba is in progress and a ringbarking, shading and defoliation trial is to begin shortly. Growth studies have been initiated to determine the correlation between altitude and node number, extension growth and yield.

Nylon resistance units have been used to compare soil moisture profiles of a wide range of treatments and the microclimate studies continue. Work is also being done on foliar analyses, drought sensitivity of coffee, legumes as a cover crop and etherel as a ripening agent.

In the soil and leaf analysis survey 85 units were sampled on various estates throughout the coffee growing districts. This is the 4th year of sampling and meaningful criteria are taking shape.

In the Tea programme the Zinc trials, which have yielded significant and valuable information, are to be continued on the four estates, Eastern Highlands, Abercoyle, Southdown and Ratelshoek.

The trial on Southdown Estate has been altered with the object of investigating the time pattern of the response to the October applied zinc spray and the residual and cumulative effect of the spray with later ones.

Planted pastures

Provision has been made for an expansion of the irrigates pasture trials at Henderson Research Station and 3,5 ha have been planted for the purpose.

Investigations continued into the effects of intensive grazing of grasses. Results confirmed that 350 kg N/ha on dryland and 450 kg N per ha with supplementary irrigation are required for high yields of grass herbage. On dryland pastures, liveweight gains of 1 386 t/ha were obtained with 7,4 cows and calves per ha while 100 ewes per hectare were carried successfully for seven months on supplementary irrigated pastures.

A growth rate study was made of Star grass to aid the designing of an intensive grazing system for this grass. Results showed that by grazing the grass when growth reached 100 mm more herbage was produced than where grazing was done at either 200 or 300 mm. Nitrogen had a negligible effect on herbage yield where grazing was done at 100 mm and a marked effect at 200 and 300 mm. Invasion of the Star grass by weeds was serious where only 168 kg N/ha were applied but there was little invasion where 504 kg N/ha were applied.

Herbage yields of some grasses were considerably more on fumigated sandveld soil than on unfumigated soil. Counts of plant parasitic soil nematodes showed that there were large numbers in unfumigated soil and few in fumigated soil; further investigations are planned on this subject.

Previously only Star grass has been grazed by pregnant ewes during summer and their lambs, born in autumn, were goitrous and deformed and mortality was high. This year Muguga Star, Bushman Mine Panicum, Paraguay Paspalum and *Paspalum dilatatum* were also grazed by pregnant ewes and lambs born of ewes grazing the Paraguay Paspalum were normal and healthy, while approximately fifty per cent. of the lambs from ewes grazing on the other grasses were goitrous and deformed, indicating that these abnormalities are not peculiar to Star grass.

This season, for the first time the research programmes of the pasture staff in Mashonaland, have been apportioned on a subject, rather than a regional, basis and as a result the staffs at Grasslands and Henderson Research Stations operate as one team.

In cutting trials, at Grasslands Research Station, the G 438 strain of *Panicum maximum* again outyielded the Sabi cultivar while, in the first season of an irrigated trial, Ermelo Lovegrass (*Eragrostis curvula*) produced greater yields of dry matter than did Muguga Star (*Cynodon plemfuensis*) and Bushman Mine Panicum (*P. coloratum*). The slow establishing Paraguay Paspalum (*P. notatum*) gave very low yields. At low levels of nitrogen fertilizer Bushman Mine Panicum produced the greatest crude protein yields, but Star Grass outyielded it at 420 kg N/ha.

At both Grasslands and Henderson, competition from the maize crop markedly depressed the growth of undersown and underplanted grasses established at the traditional time about six weeks after emergence of the crop. Earlier establishment of the grass appeared more successful but resulted in greater weed competition to both the crop and the grass.

The bacteriological laboratory, Grasslands Research Station

Work in connexion with the testing of *Rhizobium* strains continued at Grasslands Research Station.

The first stage of a field trial with lime-pelleted lucerne seed was completed and a start made on serological studies.

BIOMETRICS BRANCH

The last report from the Biometrics Branch indicated a situation with a marked upward trend in the throughput of work resultant from closer involvement of the Branch in the general research effort of the Department. September 1970 was a record month for computer usage. The improved efficiency of the Branch due to the numbers, expanded experience and improved organisation of both professional and assistant staff, permitted time to be spent on the detailed biometrical study of more complex problems as well as dealing with routine jobs for other research workers. During the year under review however the staff position in the Branch suffered a severe set-back with the resignation of two biometricians and, with the absence on higher study overseas of the most senior biometrician, the Branch's involvement in certain projects inevitably had to be reduced. This has chiefly been reflected in the abandonment of biometric research into climatological and soil moisture studies, veld assessment techniques, the sampling and evaluation of insect populations, and the general problem of measurement and interpretation in crop physiology studies. While considerable time was spent earlier in the year on the assessment of the long-term measurements made in the Mashona cattle at Makoholi this project has also been temporarily shelved. Assistance to outside bodies has been severely curtailed and this is particularly unfortunate at a time when closer collaboration, particularly with the Department of Conservation and Extension in such fields as socio-agronomic surveys, was beginning to show worthwhile results. However, it has been possible to continue the assessment of results from the ever expanding Rhodesia Beef Performance Testing Scheme. Nevertheless, this project now demands detailed professional attention to set it on a sounder footing and to investigate more fully the results on a country-wide, rather than on an individual herd basis.

To the extent of its resources the Branch has continued to supply a service to meet the ever-increasing demand for routine analyses of annual and perennial crop results and it is a great tribute to the staff that the work processed did not drop below 75 per cent. of that in the same period a year ago. Herbicide and insecticide trials, soil investigations, and research with indigenous pigs illustrate the wide range of work with which the Branch has been involved. The greatest effort has probably still been concerned with cotton breeding and agronomy. Unfortunately the problem of inadequate computer facilities still imposes a major restraint on the Branch, although the arrangement with Air Rhodesia Corporation to use their I.C.L. 1500 Computer continues very satisfactorily.

CHEMISTRY AND SOIL SCIENCE

The general analytical service provided by the Agricultural Chemistry Section has been maintained at a level similar to that of recent years. Samples from research stations for routine analysis have decreased in number, but this has been more than balanced by an increased demand for analyses involving more sophisticated determinations on a wider variety of materials. The

volume and range of toxicological work done for the Department of Veterinary Services has also increased, and a new feature has been the large number of browse and forage samples analysed for the Department of National Parks and Wildlife Management.

The annual survey of the incidence and level of aflatoxin contamination in the national groundnut crop has continued; levels of contamination in the 1970–71 crop were lower than in the previous season. Samples of farm feeds taken in terms of the Fertilizers, Farm Feeds, Seeds and Remedies Act have been monitored regularly for aflatoxin and found to conform satisfactorily to the voluntary Code of Conduct. This code, which was introduced in 1964 and revised in 1966, was critically re-examined in the light of more recent published research and revised again by the interdepartmental Aflatoxin Standards Committee.

Owing to the resignation of the biochemist in 1970, there have been no new developments in this field during the year, but assistance has continued to be given to the Plant Protection Branch in the determination of pesticide residues in plants and soils by gas-liquid chromatography.

In collaboration with Triangle Limited, the fifth year of records has been completed on the salt balance of 10 000 hectares of land under irrigated crops. These show a satisfactory balance, that is more salts have been leached out of the soil than have been brought in by irrigation water, but they also show a considerable year-to-year variation, which is greatly influenced by seasonal differences in rainfall.

The steady expansion of the Soil Testing and Foliar Analysis Section has continued, especially in its contribution to the research programme of the Department. The volume of foliar analyses done has almost doubled — once again mainly owing to greatly increased sampling of field trials at the Rhodes Inyanga and Chipinga Experiment Stations to analyse the nutritional effects of treatments—and for the first time soils analysed for research purposes have exceeded three thousand an increase of 28 per cent. on the previous year.

The soil advisory service has issued reports and recommendations based on analyses of 4 478 samples, compared with 4 135 in the previous year — an increase of 8 per cent. Requests for fertilizer recommendations for wheat again increased appreciably (37 per cent.), but this year there was only a small increase in recommendations for tobacco (3½ per cent.). On the other hand the number of recommendations for maize decreased slightly (9 per cent.) and those for cotton markedly (40 per cent.); records show that the latter decrease reflects the present loss of interest in sandveld cotton. Use of the service by African farmers has continued to increase, although numbers are still a very small proportion of the total, and recommendations for test-demonstration plots in Tribal Trust Lands have more than doubled—a reversal of the trend of recent years.

In support of the soil advisory service, fertilizer experiments on maize, groundnuts, and potatoes have been conducted on private farms, and the two long-term coffee trials in the Vumba have continued.

Following up previous groundnut experiments the Soil Physics Section, in collaboration with research colleagues and with the Department of Conservation and Extension, carried out an exercise to demonstrate the yield potential, on a commercial scale of production, of a long-season groundnut variety grown under irrigation. The farmers selected agreed to follow strictly the recommendations of the research team, and on four out of seven farms very high yields were produced.

The Biometrics Branch has produced a computer model with which to study the quality of the Rhodesian rainfall season, and to check this a large amount of moisture data under maize was collected. However, it has not yet been possible to compare these data with computed soil moisture.

After many attempts over a number of years to design suitable automatically operated rainfall shelters, a financially practicable design has been produced within the Department and the first unit has been constructed; it is expected that a second unit will be completed in time for the 1971–72 season. With these shelters it will be possibly to control completely the moisture regime under which summer crops are grown and so investigate the effects of stress at different stages of growth.

In the laboratory study of the stability of surface soil aggregates and the problem of crusting, a rainfall simulator designed and built in the Department has already proved useful. Results obtained with it have shown the beneficial effect of organic carbon and have given indications that calcium and iron could also be useful soil ameliorants. A great deal of work is necessary, however, to develop suitable techniques for studying the factors involved in the formation of crusts under the action of rainfall.

In the co-operative surface-structure trial at Henderson Research Station, land irregularities appeared during the summer and it was necessary to land-plane all plots; treatment effects cannot therefore now be studied until the 1972–73 season.

The Pedology Section has carried out a number of land-use surveys in Tribal Trust Lands and

Intensive Conservation Areas, but previous coverage is such that the demand for this type of work has been considerably less than in the past. In fact the only survey of any appreciable extent was undertaken at the request of the Rhodesia Sugar Association and covered selected parts of the sugar-producing area of the South-eastern Lowveld that had not previously been examined in detail.

Two cases of poor crop growth after long-standing irrigation were investigated during the year: on the Sabi Valley Experiment Station the cause was found to be soil compaction due to translocation of clay, and on parts of the Mutema Irrigation Scheme a high water-table resulting in a moderate degree of salinity was responsible.

Assistance is increasingly being sought by other departments in assessment of soil properties such as exchangeable sodium status and clay mineralogy, which effect the suitability of the soil for various engineering purposes.

Work has been started on what may prove to be a practical means of reclaiming sodic soils that frequently occur in association with irrigable soils in the Lowveld; early indications are encouraging.

Research has continued into the constitution and genesis of soils derived from granite in the various climatic regions of Rhodesia. Results show a correlation between clay and "free iron" contents and evidence of sub-surface clay translocation due to dispersion of the clay and water-table movements.

The sequence of weathering of primary minerals in granite fissures was investigated at Lesapi dam site and this provided a better understanding of a problem that frequently faces engineers. Physical measurements in the laboratory subsequently confirmed that it would be necessary to seal the fissures before constructing the dam.

The Soil Productivity Research Unit has assessed the effectiveness of a commercial zincated fertilizer mixture and zincated dolomite in field trials on sands. At normal and half-normal rates of application both sources eliminated zinc deficiency symptoms, promoted healthy growth of young maize, and gave equal increases in grain at sites where there was a yield response to zinc. It was found that correct placement of the fertilizer in the root zone of maize seedlings was essential.

The main series of trials on the sulphur requirements of maize was completed. Uptake of sulphur by R 200 was similar to that of SR 52 grown previously and again indicated that 20 kg S per hectare per annum should be sufficient for maize. The adequacy of the minimum permissible sulphur content of standard fertilizer mixtures (6,5 per cent. S) was confirmed by applying gypsum top-dressings to plots within stands of commercial maize that had received normal fertilizer treatments; at only one of nineteen sites was there a significant yield response to the additional sulphur in the gypsum top-dressing.

On two of the national series of maize variety x population trials the effect of fertilizer nitrogen on nutrient uptake and the stover-grain relationship of the crop was examined. It appears that R 200 should be well adapted to less fertile soils as well as to short seasons.

Studies of the effects of tillage on soil hardness, aeration and rainfall run-off in long-term trials have been accelerated, and the programme on changes in the nutrient status and organic matter content of soils under sustained cropping has continued in co-operative trials with research stations and the Department of Conservation and Extension.

With the appointment of a plant physiologist, studies of the effect of high temperatures and soil crusting on the emergence and early growth of maize have been started, and initial results are promising.

BRANCH OF PLANT PROTECTION

The new Cotton Pest Research Laboratories at Gatooma, financed by the Rhodesia Cotton Growers' Association, were completed during the year and plans were finalised for the new Plant Pathology and Nematology block.

The Pesticides Regulations were gazetted during the year and coffee regulations were introduced to control the movement of coffee vegetative material. Owing to the serious outbreak of tobacco vein browning virus, regulations were gazetted to enable the prohibition of the growing of potato stocks known to be infected with the virus. Under these regulations the potato variety Montclare was scheduled, as uncertified stocks were found to carry a high virus content.

Plant Pathology

Five hundred and thirty-five specimens of diseased material were recorded, of which 33 were infected by pathogens new to Rhodesia. Most significant of the latter were *Rosellinia* sp. on apple and Iris, *Rhizina undulata* on *Pinus patula* and *Ustulina deusta* on citrus.

Renewed outbreaks of tobacco vein browning virus, at Arcturus and Darwendale, caused concern. *Xanthomonas malvacearum* was more widespread on cotton than previously, particularly on young plants. *Botrytis cinerea* was severe on some irrigated, high density, groundnut crops. One further case of boil smut of maize occurred at Shangani. Maize streak virus was widespread, and some losses from maize stalk rots occurred.

A survey of apple scab in the Inyanga area showed that the severity of the disease varied widely, severe infection occurring in some orchards.

Studies on the survival in soil and pathogenicity of *Verticillium dahliae* continued. Natural populations of *V. dahliae* in field soils were highest towards the end of the growing season, gradually declining during the dry season but increasing again with the onset of the main rains following cotton cropping. A single intervening maize crop had little effect on subsequent infection of cotton.

In critical trials approximately 50 per cent. of microsclerotia remained viable after 250 days in both moist and dry soils, but the addition of two per cent. finely milled maize stover greatly reduced viability.

The importance of symptomless host plants on survival of *V. dahliae* in the field is becoming increasingly apparent.

Surveys of the incidence of mould deterioration in stored maize and studies under critically controlled conditions have continued. The use of light-coloured tarpaulins to reduce storage temperatures of stacked maize appears to be of practical benefit.

Nematology

Soil fumigation trials using D.B.C.P. over a two year period in land infested by *Pratylenchus brachyurus*, have resulted in increased cotton yields in excess of 15 per cent.

Host trials with the burrowing nematode and citrus continue.

Increased yields of 13 per cent., obtained the first year, were not evident the second year in D.B.C.P. soil fumigation trials with Seville oranges and the citrus nematode *Tylenchulus semipenetrans*.

The root-lesion nematode *P. brachyurus* was discovered infecting the shells of groundnuts grown in a high yield trial. Soil fumigation trials are planned for the 1971–72 season.

Highly successful results have been achieved by the hot water treatment (47,50C for 32,5 mins.) of root-knot nematode *(Meloidogyne javanica)* infected rootstock topworked with peaches, plums and nectarines. Total control of the root-knot nematode without apparent effect on tree survival was obtained.

Similar experiments are in progress with rice seed *(Aphelenchoides bessyi)*, dahlias *(M. arenaria* and *M. javanica)*, Barberton daisies and coffee. The latter appears very intolerant of hot water treatments.

Pre-plant soil fumigation with D-D in an apple establishment trial resulted, over a three year period, in increased growth of up to 25 per cent., but also in a tremendous increase in the numbers of the nematodes *P. penetrans* and *Tylenchulus* sp.

A survey of apple orchards in the Inyanga area showed that the root-lesion nematode *P. penetrans* is widespread.

The nematode *Aphelenchoides bessyi*, causing "white tip" disease of rice, has been discovered in the leaf folds and setms of 18 varieties of rice grown from seed imported from the United States of America.

The root-lesion nematode *P. zeae* has been found to be a serious pathogen of rice on several farms in the south-eastern Lowveld.

Thet finding of root-knot nematodes in "AA" potato lands at Inyanga has resulted in the introduction of a tolerance level of 0,02 per cent. for this pest.

Seed Services

The total number of samples received for test was again increased (six per cent.), the largest gain being in the number of maize samples. The installation of new seed germinators for testing large-seeded crops has speeded up turnover considerably, as in many instances the length of test has now been reduced to four days. Investigations have been initiated to study a method of evaluating the seed vigour of aged tobacco seed stocks.

A Senior Seeds Officer attended the 16th International Seed Testing Congress. As a result of this visit the activities of the laboratory have been expanded to co-operate with three more international committees concerned with world-wide uniformity of seed testing.

The total area inspected for the certification of various kinds of seed was 4 060 hectares, an increase of 42 per cent. over the previous year. Seed crops of the new sunflower variety Peredovik, and the new forage sorghum variety Saccaline were certified and released for commercial plantings.

The Seeds Act, 1965, and its enabling regulations—Seed Regulations, 1971, and the Seeds (Certification Scheme) Notice, 1971, were promulgated on the 16th August, 1971. The general effect of the Seeds Act, which replaces the relevant sections of the Fertilizers, Farm Feeds, Seeds and Remedies Act, 1952, is to broaden the scope of the regulations, introduce a definitive procedure for the certification of prescribed varieties, and include modifications in response to representations by trade and seed associations.

Entomology

A number of swarmlets of the migratory locust, *Locusta migratoria migratorioides*, which invaded the south-eastern Lowveld in June were successfully controlled with fenitrothion and carbaryl applied from the air.

Pesticide residue analysis by gas-liquid chromatography, continued on soils treated with aldrin, dieldrin and DDT. Six months after treatment the percentage of insecticide remaining in the soil was: Aldrin, 12,6 per cent, dieldrin, 56,3 per cent. and DDT, 62,5 per cent.

Rates of development at different temperatures for the egg, larval and pupal stages of the cutworms *Agrotis segetum* and *A. ipsilon* indicate that *A. ipsilon* is capable of completing five generations a year and *A. segetum* only four. Activity recorders indicate that cutworm populations are polymorphic, containing moths and larvae with different metabolic rates, those with the high metabolic rate possibly being migratory and those with a low rate sedentary, and that the type of activity is inherited.

The taxonomic and ecological study of Rhodesian termites continued and was augmented by a useful survey of subterranean termites causing damage to growing crops in which 15 species were implicated, *Ancistrotermes latinotus* and *Macrotermes falciger* being the most serious pests.

A trial to control subterranean termites damaging maize indicated that aldrin could not be applied at less than 1,70 kg active ingredient /ha, and should be incorporated into the soil by ploughing rather than discing.

The majority of deciduous fruit orchards in Rhodesia have been inspected and 33 per cent. found to be infested with pernicious scale. Biological studies indicate that there are four to five generations per year with a prolonged cycle from April to August during the cooler months.

Intensive laboratory trials and field trials have screened six pesticides suitable for admixing with grain. Fenitrothion is the most toxic to the spectrum of grain pests encountered in Rhodesia, and at 8 ppm has given 100 per cent. mortality of all pests over 8 months.

Cotton pest research

Laboratory screening of both new and presently recommended insecticides and acaricides continued. A leaf disc dipping technique for assessing chemical activity against *Heliothis* bollworm was developed. Acaricide screening was aimed at finding unrelated compounds to use as alternatives to recommended acaricides.

Field trials of new insecticides revealed nothing to compete with the currently recommended chemicals. However, the effects of molasses addition upon carbaryl and endosulfan sprays and upon the total spray recovery in aerial application methods were of interest.

Farm scale trials of selected acaricides confirmed previous work and resulted in a new recommendation of tetradifon as an acaricide, mainly as an alternative to dimethoate.

A joint Pink bollworm survey of the Rhodesia–Moçambique Sabi border area was carried out during the dry season. Besides this, extensive surveys were carried out by Cotton Pest Research staff in the Rhodesian lowveld. One focus of pink bollworm in wild cotton was discovered on the international border just north of the Sabi River in late July. In September fairly extensive infestations were found in cultivated cotton in the Espungabera area. Wild cotton and *Hibiscus dongolensis* host plants were regularly chopped out of the known Rhodesian focus on the Sabi-Tanganda Estate after June.

The new aerial spraying trial site came into use for the first time. It was shown that the application of spray volumes below 1 litre/ha was likely to produce highly variable deposits and that the minimum useful ULV spray volume was likely to be nearer 2 litres per hectare.

BRANCH OF AGRICULTURAL EDUCATION

During the year under review the Chief of the Branch and the Senior Agricultural Education Officer were both closely concerned with the newly constituted Ministry of Agriculture Bursaries Committee; the former as Chairman, and the latter as Secretary. Five meetings of the Committee were held during the year. Considerable work was involved in drawing up agreed principles which will serve as a guide to the Committee in its future work.

In addition to responsibility for the two Agricultural Colleges, Esigodini Agricultural Institute and the Department's In-Service Training Course, and maintaining contact with Gloag College of Agriculture, towards the end of the year, as part of a redelegation of duties at Head Office, the Branch assisted in the co-ordination of recruiting, staffing and financial matters.

During the year the Senior Agricultural Education Officer made a personal visit to all those farmers and others who are directly concerned with the Farmer training scheme in the Marandellas area.

The staff of the Branch served on a number of Committees apart from the Ministry's Bursaries Committee already discussed. Among these were the Metrication Council's Functional Committee for Agricultural Technical Services (Agritech), and the Editorial and Management Committee

of the Rhodesia Agricultural Journal. The Chief of the Branch continued to serve on the Board of Studies in Agriculture of the University of Rhodesia, and the Standing Committee on Agricultural Mechanisation.

Gwebi Agricultural College

The College year began on the 1st October, 1970 with 83 students in residence and ended on Friday, 10th July, 1971.

Forty members of Course 21 sat their final diploma examinations and thirty-three were awarded diplomas of the College, eight being first class diplomas. Of the forty-three members of Course 22, forty satisfied the examiners and were accepted for entry into the second year.

The College farm experienced a difficult season. The total rainfall was well above average with 1 012 mm of rain but the majority fell within a 96-day period, with the last effective rain falling in the middle of February, 1971.

The short season affected both arable crop and grass production and the situation was aggravated by heavy rains and strong winds which laid flat a large proportion of the maize crop. Satisfactory yields of maize were obtained from SR 52 maize planted before the onset of the rains with supplementary irrigation and from the short season variety R 200 planted at the normal time under "dryland" conditions.

Livestock production was satisfactory and the Friesland dairy herd produced the highest average yield since its establishment with a mean yield of 5 647 kg milk.

The Seventh Rhodesian Random Sample Egg Laying Test terminated in January, 1971 and as the question of future tests is under review this programme has been temporarily suspended.

Considerable development has taken place during the year and good progress made with the construction of the new lecture hall which will be completed before the end of the next academic year.

The irrigation scheme has progressed and 20 hectares can now be commanded by flood or overhead spray irrigation, the water being pumped from four boreholes. In addition bulk storage facilities for about 550 tonnes of maize have been constructed as well as a vehicle service bay and African quarters for 8 families.

Facilities in the Poultry section were improved and expanded and plans made for the construction of a controlled environment house which is required for experimental purposes.

A sewage scheme which caters for the whole of the College has been completed and the re-designed electrical reticulation system proved very satisfactory during the periods of peak load.

The stoep on the Sports Pavilion was extended to provide additional accommodation for sports functions and dances, the squash court floor was re-laid and the tennis courts re-surfaced.

Student tours were made to many farms, factories and research organisations including the Eastern Districts, the Lowveld and Matabeleland and we are extremely grateful for the help, co-operation and hospitality we received from our hosts.

The College Council under the chairmanship of Mr. J. McIntyre continued to take an active role in College affairs and their interest and guidance is gratefully acknowledged. Diploma Day was held on the 21st October, 1970 with Mr. and Mrs. J. W. Field as Guests of Honour.

Chibero Agricultural College

With 20 students in their first year, 31 in their second year and 29 in their third year the College had a full complement of students.

The academic year ended with the Diploma Day Ceremony on the 29th July, 1971 at which the Principal and Vice Chancellor of the University of Rhodesia, Professor Dr. Robert Craig D.D. was the Guest of Honour. All 29 third year students were successful and received the College Diploma in Agriculture, one being a first class diploma, also the St. John's Ambulance First Aid Certificates taken during the year.

It is pleasing to report that all 29 students are employed—8 by the Rhodesian Government, 7 by statutory bodies, 6 by large companies and 8 by private farmers.

The final selection of thirty Course 11 students was completed in the first week of August 1971. An improved multiple choice objective test was used with very encouraging results and the selection was made from sixty-eight short list candidates all of whom had testimonials saying they had had experience in Agriculture since leaving school.

The rainfall in the first half of the season was satisfactory but little rain fell after the end of January. As a result, crops were disappointing though the following yields were obtained per hectare—Burley tobacco, 2,331 tonnes, cotton, 2,475 tonnes, groundnuts, 2,025 tonnes and maize, 5,434 tonnes.

The Engineering section had a busy year with many projects underway. A maize crib was built, the milking shed and yards doubled in size, extensions were made to the beef feeding pens and work started on four blocks of bachelor quarters in the compound.

Grateful acknowledgement is made for all the willing help given by visiting lecturers and external examiners, to the many farmers and organisations who welcome visits from our students and to the many generous sponsors who, through their scholarships, aid the students financially.

Several new members of the College Advisory Council were welcomed to the meetings this year, Mr. C. A. Murray as Chairman with Chief Benhura, Mr. C. Boyd-Clark, Mr. Madzinbamuto, Mr. T. A. Murton (Ministry of Internal Affairs), and Mr. A. J. Smith (Ministry of Education, Division of African Education) as members. The enthusiastic support and guidance of the College Advisory Council is acknowledged with gratitude.

Esigodini Agricultural Institute

Following yet another difficult season, the average rainfall for this Institute has now fallen below 660 mm per annum. The first effective rain fell on the 12th November, 1970, and in spite of only negligible rainfall between the 20th November and the 20th December, 1970, the total rain recorded for the period 12th November, 1970, to 25th January, 1971, was 420 mm, which was 47 mm above average for the three months of November, December and January. The total for the season was 488 mm which is 170 mm below average. In spite of the short growing season the average yield of sorghum for silage increased by 2 tonnes to 18 tonnes per hectare.

The major development projects completed by the students were the construction of a guest wing at the Principal's house and a pump house on the Irrigation section. The Irrigation section has been completely re-planned and a permanent main line with risers has been laid.

All is now ready to utilize the water it is expected will be supplied, by the Department of Water Development, from the Ophir mine, during the next financial year.

A start has been made on establishing an Nkone Herd at the Institute. The present herd comprises one bull from Tjolotjo Experiment Station, six cows from Mlezu Government School and 26 heifers from Nyamandhlovu Experiment Station. Seven selected heifers of the Tuli cross Sussex stock were kept. The rest of the female stock, 58 head in all, were transferred to Khami Prison Farm. With a strict culling programme to establish a good Nkone Herd, it will be several years before the Institute is again fully stocked.

The Institute's first Certificate Presentation Day was held on the 3rd August, 1970. The certificates and trophies were presented by the Guest of Honour, Senator Dr. B. S. Ellis.

Sixteen of the 22 students who started on Course One wrote the final examinations and obtained their Certificates and a total of eight distinctions were awarded. Of the 18 students who started on Course Two, 15 successfully completed their second year and will be returning to complete their training.

Twenty out of the 24 students who started on Course Three wrote their examinations and 18 of them have passed their first year successfully. Employment prospects for the Institute's trainees are good and 11 of the 16 final year students are known to have employment. We have not heard from the other five.

J. C. RAATH,
Director,
Department of Research and Specialist Services.

Annual Report of the Director of Conservation and Extension

for the year ending 30th September, 1971

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ORGANIZATION AND STAFF

Organization

NO further change has occurred in the organization of the Department since the transfer of functions in the Tribal Trust Lands to the Ministry of Internal Affairs.

Establishment: Senior staff

Twenty officers resigned during the year.

Mr. A. S. Valentine, who was Provincial Conservation and Extension Officer, Matabeleland, retired from the Service in May.

The vacancy position at the end of September was made up as follows:

Conservation and Extension Officers .	11
Conservation Officers	1
Subject Matter Specialists	5
	17

New appointments during the year amounted to 34 in addition to four officers who joined the Department on transfer from other departments.

Junior staff

A small number of vacancies occurred due to resignations, discharges and retirements. No difficulty was experienced in filling these posts.

Administrative staff

Administrative staff turnover has been high. No less than 10 resigned and five transferred to other departments.

New posts

1. The establishment was increased by the addition of two Assistant Publication Officer posts in the General Division.
2. One post of Pests and Weed Officer has converted to Grain and Herbicide Specialist, and one from Conservation Officer to Extension Specialist Agricultural Engineer.

Housing

Funds were provided for the construction of quarters for one European officer at Mangula. Unless more money is made available it will be a long time before the Department's needs are met.

The provision of adequate housing for African staff continues to be a major problem. However, funds for three units were provided this financial year but even at this rate it will take over 10 years to arrive at a satisfactory housing position.

The provision of additional funds for maintenance is also very necessary.

Office accommodation

Composite office accommodation is being built in the Mount Darwin, Sinoia, Gatooma, Gwanda and Filabusi areas. Office accommodation at Rusape, Enkeldoorn and Grasslands remains unsatisfactory.

Water supplies

The need for rainwater storage tanks to augment existing sources of water supply for staff in Purchase Lands has been highlighted once again. Dry conditions in the Victoria Province made necessary the transportation, over long distances, of water for the domestic use of some Extension Assistants. All new houses in which piped water is not installed have been provided with rainwater guttering and storage tanks.

Transport

The recently introduced regulations permitting payment of an extra cent per mile for vehicles operated on dirt roads is a step in the right direction. The rates are, however, still considered to be inadequate.

Visits to other countries

The number of study tours has been maintained at approximately the same level as last year. These have always been regarded as being an important and effective means of establishing contact with workers in the same field, with a view to exchanging technical and scientific knowledge and of keeping abreast with current developments in the different aspects of the Department's work. Details are shown in Appendix I.

Boards, meetings and conferences

The very nature of the Department's intimate involvement in almost every aspect of the agricultural industry requires it to be represented on a large number of committees. Details are listed in Appendix XI.

Staff training

A full programme of staff training was maintained and this is recorded in appendices IVA and IVB. In addition, the Directorate, all Provincial Conservation and Extension Officers, Assistant Provincial Conservation and Extension Officers, and all Heads of Branches have enrolled for the management training courses offered by the Public Services Board; all have participated in the introductory short course. The main training will occupy about ten days during 1972. Most officers asked to undergo this training within groups made up of participants drawn from various ministries and departments of Government, rather than undergo training as a wholly Conex group on one course.

THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION

The weather

Although more erratic, except in areas to the north of Salisbury where it was above average, the season was better than that experienced in 1969. Good rains fell early in the season but became patchy early in the new year.

Since little runoff occurred after December some dams did not fill. In the Kyle catchment, gentle penetrating rains resulted in a reduced inflow into the Lake which, in consequence, stored even less water than in previous years. An early cessation of general rains followed by a long dry spell extending into the middle of March led to a reduction in cropping yields by as much as fifty per cent. in the Mashonaland South, Matabeleland, Midlands and Victoria provinces.

A severe hailstorm early in the season damaged most of the apple crop in the Eastern Highlands.

Generally, the winter was mild and dry, and little rain or drizzle fell before the middle of September. Frost was isolated and occurred in only the most susceptible areas.

SOIL CONSERVATION

All provinces report a significant improvement in mechanical protection works on arable land, attributed to the lead given by the Department's "tougher approach" policy. This has given field staff a new conservation outlook and has had an encouraging influence on I.C.A. committees, who are now more willing to recommend positive action against farmers who do not take steps to protect natural resources. Aerial flights helped to pinpoint trouble spots and assisted in stimulating interest among I.C.A. members.

Despite general improvement and willingness to take positive action, the overall standard of conservation works still remains poor. Construction is often well below the required standard and the need for regular maintenance is too frequently, and widely, ignored.

Appendix V, Soil Conservation, shows that the area of land protected has increased by 20 648 hectares, and that the gap between works pegged and constructed has widened slightly from 1 400 km last year to 1 800 km this year. A proportion of farmers do not appear to appreciate the need to build these conservation works immediately after pegging. The number of waterways pegged has decreased slightly by 69 km while the length of farm roads pegged has increased by 17 km.

Veld management and pastures

Farmers continue to show a very considerable and growing interest in veld management. Veld management field days and courses for farmers have increased in number from 145 during the season 1969—70 to 358 this year, whilst attendance figures increased from 4 716 to 13 134. This indicates a very significant interest in veld management but, despite this, the number of veld management plans requested decreased slightly. A much greater follow-up effort is needed in the future if progress is to be maintained.

Notwithstanding the reduced area planned, encouraging progress was made. A total of 1 378 farms were planned, representing 1 336 514 hectares, or 8.1 per cent. of the farming area. This brings the total area planned in the European and Purchase Land farming areas to 4 758 266 hectares, or 28,9 per cent. of the total farming area; i.e. 16 473 492 hectares.

It is also very noteworthy to report that two areas, the Mshawasha Purchase Land and the Chatsworth I.C.A. have already surpassed the planning targets they set themselves; that is, 75 per cent. of the grazing areas planned by 1975.

Veld-grass improvement was spectacular where short-duration grazing systems were applied, but problems relating to grazing techniques and animal manipulation continue to be encountered. The importance of stocking rate and grazing pressures is sometimes not fully appreciated, and is especially apparent when farmers retained weaners in an effort to avoid selling on the recently depressed young-stock market. It is assumed that this is only a temporary measure, but it has nevertheless led to over-stocking and consequent deterioration of the veld.

The need to maintain proper veld management records cannot be over-emphasised; stocking rates and grazing pressures are vital factors in any system of veld management and cannot be ignored.

Veld fire is an associated problem of increased herbage during the winter months, particularly in the higher rainfall areas. A number of I.C.A.'s have put forward Fire Plans which have been well implemented on the ground. Unfortunately, their efforts were, to a quite considerable degree, negated by high winds and the indifference of some individuals.

Interest in the establishment of fertilized pasture under irrigation is increasing. The irrigation of pastures induces an early growth-flush, thus lengthening the grazing period and enabling farmers to take advantage of the chiller-contract market. Irrigated fertilized pasture enables farmers to finish their animals earlier than would be possible on the veld, or on pastures under natural rainfall conditions. Where efficient and inexpensive irrigation systems are possible, this means of

grass production could become economically significant.

WATER CONSERVATION

Interest in water conservation has remained high and, generally, the demand for services is greater than the Department can meet. The shortage of engineers in the Ministry of Water Development has contributed to the reduced rate of farm-water development, and has thrown additional responsibilities onto Conex field staff.

The number of dams and/or weirs constructed has declined from 283 to 276. However, interest in irrigation has given more emphasis to the larger dams and this is reflected in the increased capacity of those constructed; i.e. from 28 600 to 55 000 cubic metres.

A number of farms in the Purchase Lands were laid out, apparently, without regard to the availability of water. The farmer's need of water is often so desperate that he demands a dam, irrespective of whether or not the site is suitable. The inevitable result is a dam which requires greater attention to maintenance than he can provide. The Mashonaland North Province recommends a review of policy regarding the provision of water for farms in the Purchase Lands. The most reasonable solution appears to be the provision of piped water supplied from a communal dam.

FIELD TRIALS AND DEMONSTRATIONS

Livestock and grazing trials

Tuli grazing trial: Steers are being used on two systems of veld management which are being compared on cleared and uncleared veld.

The following are the mass gains recorded over the past 13½ months up to August, 1971.

	Short-duration grazing		*Split season (1 herd 3 paddocks)*				
	Cleared	*Uncleared*	*Cleared*	*Uncleared*			
LU/ha .	1:6	1:7,6	1:6	1:14	1:12	1:8	1:4
Mass gain kg.	144	111	130	111	131	94	52

Masera (Beitbridge) grazing trial: This trial demonstrates, with steers, a 1 herd : 3 paddock split-season system and a 1 herd : 7 paddock SDG system. The present layout was established in July, 1969. The trial was stocked 1 : 16 ha from July 1970 until March 1971, when the first group of steers was sold. Restocked at 1 : 12 ha, the animals gained 90 kg on the SDG and 85 kg on the split-season system since the end of March.

Lupane grazing trial: Steers are being run on ring-barked Kalahari forest in a one herd two-paddock system at three stocking rates 1 : 6 ha, 1 : 7,2 ha and 1 : 9,6 ha. Each paddock was divided to permit two groups of animals per stocking rate. Each group is provided with a basic supplement of cottonseed cake and, in addition, three treatments, one at each stocking rate:

(i) free-choice minerals throughout the year;
(ii) phosphate throughout the year;
(iii) urea/molasses lick in summer.

Free-choice minerals

Two trials are being conducted—one at Annadale, Somabula and the other at Belvoir Spinney, Enkeldoorn. Results so far are inconclusive.

Fertilized pasture trials

Pasture trials have been in progress on the following properties for one year:

Atherstone Ranch	—	Limpopo ICA
Avondale	—	Angwa North ICA
Marere	—	Darwendale ICA
Merroleigh	—	Chipinga ICA
Mushangwe Estates	—	Wenimbi ICA

The main objects are to study herbage-production effects, under dryland conditions and under irrigation, of high levels of fertilization, fertilization with minor elements, and intensive rotational management. Results will be presented at a later stage.

However, it is pleasing to report that up to 60 000 kg/ha dry matter have been recorded from the Merroleigh trial where Kikuyu grass is being intensively managed under supplementary irrigation. Toxic levels of nitrate nitrogen in the herbage have been associated with grass yields as high as these. This aspect is to be studied further.

Bush-control demonstration plots

A "popular" version of the collated report on the 19 bush-control demonstration plots was finalized and published in the Rhodesian Farmer. The more technical report will be published in the R.A.J. Grass yields on these plots will continue to be taken so that production from treated and untreated plots may be compared and variations in grass yields over a number of seasons may be assessed.

A few supplementary observation trials are being conducted.

Critical crop trials and demonstrations

These trials covered the whole range of crops excluding tobacco, and included bush control, free-choice minerals and irrigation.

The new maize variety R200 was demonstrated in many Purchase Lands where results were outstandingly in its favour, often producing twice the yield of others.

Whole-farm demonstrations have generally been found to be more suitable for demonstration in the Purchase Lands and these have gradually taken the place of test demonstration plots.

SPECIALIST BRANCHES SERVICES

Engineering

The last year has seen two important developments in the Engineering Branch:

1. Re-organization of existing staff within the Branch and the conversion of a technical post to a professional one, enabled the Conservation Section staff to be increased from one professional engineer to three. So far this has made very little practical difference since one engineer will not be available until he completes his military training in December 1971, and the other was not transferred to this section until August. This team is expected to make a very big impact on the much-needed conservation aspect of the work.

2. The establishment of basic facilities at the Agricultural Engineering Centre, Hatcliffe—which includes the 23 m x 15 m SCAM workshop and basic machine tools — will enable staff to be much more productive in future years.

All existing posts in the Engineering Branch are now filled, but the demand imposed on the extension side continues to increase and far exceeds the capacity of the present establishment.

Agricultural Engineering Centre

The Agricultural Engineering Centre at Hatcliffe is now operational so far as the Tillage Section and the Machinery Testing and Developing Section are concerned but, because of limited funds and staff, it has been necessary to slow down overall development such as parallel contour layouts, roads and an air strip. However, that part which is already developed will be adequate for the needs of the research programme planned for the next few years. In future, machine testing will be done under the auspices of SCAM; this body has now drawn up terms of reference which include testing and research regulations. These regulations clearly define Departmental responsibilities and encourage the publication of available data for the benefit of the farming community.

Tillage trials

In addition to the tillage trials which were established over seven years ago and which continue to produce valuable results, new observational trials were started last year on farms at Tengwe; the intention is to try to solve the specific problem of low water-infiltration rates and resulting soil erosion. This trial has produced some valuable leads for future work and new trials are planned for the 1971–72 season. In addition to these existing trials, new trials in marginal-rainfall areas have been planned for farmers in the Victoria, Midlands and Manicaland Provinces. Also planned are the first field-trials in Purchase Lands based on the Department's frequency-of-ploughing trials, whereby lands are ploughed only every second or third year, minimum-tillage treatments being used in other years. Results to date are very promising but before the large-scale adoption of some of these techniques is encouraged, more experience in the marginal cropping areas is necessary.

Machinery development and testing

To date, most of the testing has been done on an informal basis, pending suitable regulations which have since been drawn up by SCAM, and which now await final approval by the various parent bodies. It is expected that all future testing will be based on these regulations and, where appropriate, charges will be levied by SCAM. These will not, however, preclude field observations and evaluations of certain equipment by Conex staff where this information is necessary for extension purposes.

The work done by this Section during the year has been mainly on behalf of the Grain Producers' Association. It has provided information relating to grain drying — particularly maize — and grain-conveying machinery has been tested. The grain-drying work will provide basic information which will enable the Grain Producers' Association to plan developments that will ensure a high-quality export product.

The project concerned with developing an improved ox-plough is progressing satisfactorily. Although the initial entries for the plough competition were not entirely satisfactory, the competition has now been re-opened with a total of nine entries, including one from Malawi. Some of these should adequately meet the requirements laid down. The testing of these ploughs should be completed by about April, 1972, when the Ploughing Association of Rhodesia will award the Silver Medal to the manufacturer of the most satisfactory plough, meeting the required specification.

Extension

Demands for technical services concerning mechanization far exceed staff availability. It would seem that, associated with the greater awareness of techniques related to tillage, ploughing and contour construction, an increased demand arose in these contexts for field days, demonstrations and discussion groups. Accordingly, training staff from the Farm Machinery Training Centre assisted whenever possible. However, staff and travelling limitations confined the bulk of the extension effort to the two Mashonalands; very little extension work was done in other provinces.

Farm Building Section

The increasing volume of farming capital now expended on buildings, resulting from the progressive industrialization of crop-culture, has taken dramatic strides during the last few years. Accordingly, professional planning of farm structures is desirable since this must inevitably enhance yields from building investment by making industrial-design concepts possible.

Although the Farm Building Section was reinforced with a technician, requests for advice still exceed staff capacity. The bulk of the work has been in connexion with the bulk handling of maize, burley barns, coffe pulperies, and cattle-handling facilities. Advice has been considerably reinforced by the 10 publications produced by the Section, one being a specially commissioned metricated farm-building handbook which received high praise from the industrial sectors concerned.

The Section organized two five-day courses for Ministry of Internal Affairs staff.

A popular feature of the Section's activities is the series of scale models to which a number of farm structures were built in Northern Mashonaland.

Training—mechanization/engineering

The Farm Machinery Training Centre at Domboshawa conducted a total of 28 courses attended by 342 trainees, who came in approximately equal numbers from Conex, the Ministry of Internal Affairs, and the farming community. All the courses were well attended except those run for Europeans which were attended by only six farmers.

In addition to the courses run at the Farm Machinery Training Centre, numerous field courses were given by the Ox Equipment Mobile Units operating in Purchase Lands. These included 132 one-day courses and 31 two-day courses and, in addition, 12 short courses were given by the Tractor Unit.

The Conservation Section conducted four one-week-soil and water conservation courses, two each for Conex staff and staff of the Ministry of Internal Affairs.

Conservation working account

A total of 75 dams were constructed, 57 for farmers in the European and Purchase Lands and 18 in the Tribal areas. This is slightly less than in the previous year when a total of 81 dams were constructed. The total productive hours rose from just under 13 000 for 1969–70 to just under 15 000 for 1970–71. These additional hours are attributed to increased bush-clearing work for farmers and Government departments. The Trading Account closed at the end of the financial year showing a profit of almost $3 000 compared with the previous year's loss of $22 000. However, this was due mainly to the Mashonaland-based units which showed a profit of over $16 000, largely nullified by the Midlands-based units' loss of $14 600.

HUSBANDRY

The Husbandry Branch was fully staffed for most of the year except for one vacancy in the Tobacco Section. A post in the Pest and Weed Section which became vacant in April was converted to a much-needed post of Grain/Herbicide Specialist.

Specialist officers devoted much time to staff training, active participation at field days, discussion groups and a large number of technical articles which were written for the agricultural press. The demand from farmers for specialist advice on all aspects of production and for specialist attendance at field days has increased considerably. This has caused considerable difficulties since staff are expected not to exceed their mileage allocations.

The Senior Tobacco Specialist visited the United States of America on a study tour.

The Pasture Specialist attended the South African Grassland Conference.

The Animal and Pasture Specialist, Mashonaland South, attended the Annual Conference of the South African Animal Production Society.

The Oilseeds Specialist visited South Africa on a study tour.

Agronomy general

An increasing interest in the use of wet land for maize production has developed in Mashonaland South. As a result of the success achieved on this class of land interest has spread to other provinces. Wet lands enable farmers to establish their maize crops early and to avoid moisture stress during critical stages of plant growth. The practice has also resulted in considerably increased yields on individual farms. One farmer has attained a yield of 8 360 kg/ha in the Wedza area where the average yield of maize over the last six years has been 2 200 kg/ha.

At least three factors appear to be essential if erosion in wet areas is to be prevented:

(i) Sound censervation layouts and high standards of construction and maintenance of conservation works.

(ii) Adequate widths of natural undisturbed vegetation in and on both sides of the natural drainage ways.

(iii) Early planting and sound cultural practises.

As a result of detailed analyses of Rhodesian climatic data, with particular reference to rainy pentades and the length of the growing season, farmers have become much more aware that season length is probably the main factor limiting crop production. In consequence, the area devoted to water-planting and dry-planting will increase greatly. In addition, a marked swing to the short-season maize variety R200 is predicted. This variety has done particularly well in marginal areas and yielded some 2 200 kg/ha more than SR52 in areas where the season was particularly short and poor.

Pests and Weeds Advisory Services and Inspectorate

A total of 5 720 inspections were made under the Plant Pests and Diseases and Noxious Weeds Acts. During the year, 78 prosecutions were finalized and 72 are pending against farmers who failed to comply with the requirements of the above Acts. Fines paid totalled $1 249.

Fifty tobacco manufacturing premises were inspected and 33 licences issued.

Three hundred and fifty-eight enquiries concerning herbicides were dealt with. Forty-nine meetings were attended and six lectures presented on herbicides.

Apiculture

Interest in beekeeping has continued and honey production exceeded 400 tonnes. A new wax-foundation factory at Umtali is producing an excellent product. Indiscriminate spraying has led to the extinction of many bee colonies but, nevertheless, bees are in increased demand as pollinators.

A major producer is unable to meet the demand for good beehives and several smaller manufacturers have entered the business.

Research into controlled mating in an enclosure commenced. Many persons visited the Bee House at Henderson Research Station; three bee courses were held.

IRRIGATION

Present trends in irrigation

A notable trend in the higher rainfall areas is farmer awareness of the economic value of irrigation under their conditions. This is illustrated by the development in the Mazoe Valley, and in tea, coffee and fruit areas of the Eastern Highlands.

It is also pleasing to report that most potential irrigators are making full use of the Department's provision of an economic evaluation of their schemes on a whole-farm basis.

The general trend continues towards sprinklers and away from flood or surface methods. This has been offset to some extent by the increasing popularity of "lay-flat" tubing which, due to its ease of operation, its degree of water control and cheapness in relation to other methods, has a great future in Rhodesia. Farmers in the coffee and fruit areas tend to favour basin irrigation fed by portable tubing connected to hoses.

Advisory work

That management has improved significantly is witnessed by the increased interest shown in evaporation pans and requests for scheduling guidance. However, much improvement is possible since average yields currently obtained are far below the potential. A greater degree of specialized extension cover is essential if the challenge of higher yields at a lower production cost is to be met. Specialists are doing an excellent job in giving advice and assistance on the installation of schemes, but seldom do they find sufficient time to revisit the schemes they designed. Such follow-up visits are of as much importance to the irrigator as they are to the designer, because it is only by close observation of existing designs and management techniques that shortcomings and deficiencies can be corrected.

Activity in the Tribal Trust Lands is now purely advisory, and was limited to the Matabeleland and Victoria provinces.

The Hatcliffe Irrigation Equipment Testing Centre was set up during the year, the first of its type in Africa. Its main purpose is to test the performance of locally manufactured equipment and to provide the technical data necessary for the more efficient design and layout of farm sprinkler schemes.

To date, sixty-eight individual tests have been carried out. Work has also been completed on three series of tests relating to pressure and distribution patterns, plastic stream-straighteners (requested by the manufacturers) and the effect of alignment in relation to the prevailing wind.

Great interest has been shown by the commercial sector which donated equipment costing several hundred dollars. Thanks are also due to the Sabi-Limpopo Authority which provided the bulk of the funds for the tarmac pad and other ancillary equipment.

Training

Five irrigation-training courses were held during the year: one of two-weeks' duration for staff of the Ministry of Internal Affairs, and a similar course for Departmental staff; two four-day courses for Extension Assistants working in the Purchase Lands, and a three-day refresher course for Conex officers.

Investigation and development

The Ministry of Agriculture Irrigation Development Committee—a small working committee chaired and to a large extent staffed by members of this Department—is charged with investigating, reporting and recommending priorities for large-scale irrigation schemes in the farming areas.

To date, it has investigated and prepared final reports on the Umfuli (Fopogena) and the Wengi Stage II schemes, and is currently concerned with investigations of the following schemes for which interim reports have been submitted:

Shamva–Bindura Scheme;
Umniati–Manese Scheme;
Eben Dam Scheme;
Marodzi Scheme;
Umzingwane–Shobi Scheme;
Umwindsi–Arcturus Scheme;
Odzi–Osborne Scheme;
Lesape Dam Scheme.

There was a slight decline in the number of farm schemes investigated earlier in the year, due to the discontinuation of the Farm Irrigation Fund. However, Agricultural Finance Corporation water loans are now functioning and a renewed interest is evident.

TRAINING

In addition to a full programme of formal courses, the year has been characterized by increased programme-planning activities by field staff. This has led to individual officers seeking direct information, advice and support in the development of effective local programmes. When and where programmes have been established, extension methods were used to more purpose, designed to meet the needs of the programme objective.

Within the programme of formal courses provided by the Department a system of objective testing for all training has been initiated. The purpose behind this is to increase the training pressure by disciplining all lecturers to present their material precisely and objectively. All are being asked to arrange pre- and post-testing for each and every session and/or course and to plan their teaching in accord with the principles of criterion behaviour. The system has started but is not yet complete. Where applied, the results show a very positive response and a welcome increase in course effectiveness and training pressure.

The Department has provided a full programme of training for officers of the Ministry of Internal Affairs. The organization of this programme has been an improvement on the previous year when this inter-ministerial arrangement started.

Recruits

During the year under review 17 new recruits received induction training, consisting of an introduction to extension, basic levelling, elementary photo-interpretation and—an innovation during the year—an introduction to the Beef Performance Testing Scheme. The introduction to extension is also an innovation and is evaluated through objective testing. All other elements of induction training are being evaluated by pre- and post-testing.

Domboshawa Training Centre

The year's programme at Domboshawa has been characterized by a notable increase in the trainee/training days for African staff courses; the Centre has been more positively used in this connexion than in previous years.

The Domboshawa Training Programme enjoyed the support of other ministries and departments of Government including Community Development Training, Health, Veterinary Services, Research and Specialist Services, Internal Affairs, Land Settlement and the Natural Resources Board.

Domboshawa staff assisted at other courses held within the Domboshawa complex and at the Red Cross Training Centre at Westwood; they also conducted extension-method courses at the Rowa Training Centre, near Umtali, for all African staff in the Manicaland Purchase Land group.

Similarly, services offered by the Department continue to be in demand for various extra-mural training; i.e. B.S.A.P. Promotion Courses, various courses at Ranche House College and, at the University of Rhodesia, the agricultural degree course, the Certificate of Adult Education, the Certificate in Field Ecology, and many others.

Mobile Training Unit

The Mobile Training Unit returned to Domboshawa from the Henderson Research Station where it had been stationed for nearly a year to facilitate farmer visits to the Small Farm Unit there.

The Mobile Unit supports the training activities of field staff and has proved most useful. More than 3 000 miles were covered during the year; more than 19 000 people were contacted.

Committees

The Chief Training Officer is Chairman of the SARCCUS Standing Committee for Extension and Education which organized an Extension Methods Workshop for SARCCUS territories. The Workshop was held in Swaziland during July and the major contribution was provided by the Rhodesian team consisting of the Chief Training Officer—who chaired the Programme Committee—

the Senior Training Specialist, and a lecturer from the University of Rhodesia.

Extension research

Research into the effectiveness of the Department's extension effort continued during the year. It is essential for this to be objective; only when an objective is clear can the effectiveness of the methods employed to attain this be capable of evaluation and assessment. Promoting the development of objective programme plans in as many districts as possible has therefore been important. Specialists were obliged to give training in programme planning techniques, and to evolve some standardized procedures and documentation. This necessitated a temporary deflection from the extension-research function. An increasing number of programme plans are now coming forward, offering a more meaningful opportunity for extension research.

More programme plans are now on file, making possible a systematic review of the Department's operations with many ICA's. Significantly, committee members and other farmers are deeply involved in the best programme plans. Other plans reveal that the concept of true programme planning is not always fully understood: some training has been directed to overcome this lack.

Some research investigations were abandoned or delayed because of inadequacy of data-processing facilities, a bottle-neck and a major inhibitor of extension research.

A situational survey of the present position and circumstances of various farming news-letters was made by the Department, and data from a survey of sources of information available to farmers is being analysed.

On behalf of the Natural Resources Board, the Section devised a form of survey to assess the value of NRB publications. A survey of sources of agricultural information in Purchase Lands was completed; analysis is proceeding.

In Matabeleland a survey review of the effects of agricultural extension in the Gwatemba Purchase Land was analysed by this Section.

The Group Conservation and Extension Officer at Mazoe conducted a postal survey to assess the degree of communication between Conex staff and research stations.

Home economics

Through the publication of three articles in the Rhodesian Agricultural Journal and the subsequent production of five colourful leaflets, nearly 2 000 letters of request for written material and, particularly, for the pamphlets were received during the year. Letters of congratulation on the production of these pamphlets have been received from neighbouring countries and from as far afield as Canada and Norway.

Home Economics played a supporting role in programme planning. Attendance at farmers' field days improved when the programme included an element for each sector of the family: the farmers, the children and the women. This has been particularly noted at Featherstone, where women drew up their own programmes and exhibited great enthusiasm for the various projects. As the Home Economics Section is established with only one specialist officer post, its functions are largely those of a bureau responding to requests for advice and information. Such information is put to good use, particularly when it is supplied in significant quantities to womens' voluntary organizations and to other departments of Government.

Twelve articles were written by the Home Economics Specialist during the year.

Publications

The year has been one of high productivity. Staffed by the Publications Officer and two assistants, the Section received occasional assistance from two training specialists. One of the Assistant Publications Officer posts has been filled only latterly; the incumbent is presently under training at Head Office, prior to posting to Bulawayo to handle siNdebele material in the training context and particularly for broadcasts over the R.B.C. network.

The Publication function has become more efficient during the year due to the acquisition of two important pieces of equipment:

(i) A high quality portable tape recorder is now in constant use to record farmer interviews which form part of the Department's radio broadcasts.

(ii) A VaryTyper compositor was acquired and is in limited but increasing use while operators are under training.

The Section continues to be responsible for regular twice-weekly broadcasts over the African radio service beamed at both the Shona and the Matabele audiences. A substantial quantity of appreciative correspondence has been received in connexion with these programmes. In addition to its direct broadcasts the Section provides regular short items of topical interest to farmers, for broadcasting every week; many of these items are also published in the agricultural press. In all, 557 Farming Reminders of this kind were released during the year.

Many papers were published: a large number dealing with irrigation were printed in the Agricultural Handbook.

The Department's Farm Management Planning Pocket Book is in great demand; it is now being reprinted in revised and updated form.

The Ministry's newspaper for African farmers, "Kunzwa Ukuzwa", is now published by the Department; five editions have now been published. The presentation is in three languages, presenting printing difficulties and considerable delay in publishing on due date. However, the advent of the VariTyper will provide the printers with finished copy and considerably expedite prompt production.

Youth extension

The year's work was mainly directed at conservation education in the school and the conservation education needs of various youth organizations.

Close liaison was maintained with the Young Farmers' and Natural Resources' Clubs of Rhodesia, on whose behalf the Section organized the Biennial International Farm Youth Exchange with the Republic of South Africa and the Victoria Region's Annual Prize Trip to Lourenco Marques.

European, Asian and Coloured Young Farmers' Clubs in Rhodesia now number 43, while African clubs in the Purchase Lands and in the European area number 197, of which 26 are in Manicaland, 45 in Mashonaland, 15 in Matabeleland, 43 in Midlands, and 68 in Victoria.

The Department also organized exhibits in support of Regional Conservation Education Committee programmes, one of which, in Bulawayo, was attended by 3 500 pupils. A similar exhibit in Que Que attracted 2 250 pupils, while 1 188 pupils attended the exhibit in Gwelo.

Conservation education camps were held in Bulawayo and Melsetter during the year.

Career guidance is a regular feature of the Department's work, exhibitions were held at Marandellas and Que Que and Umtali.

Farming inquiries from outside the country

A total of 248 inquiries from 28 countries outside the borders were dealt with by the Department during the year. They were made up as follows:

(a) by correspondence	—	170
(b) by personal visit	—	78
		248

The booklet "Farming in Rhodesia", prepared by the Department, was revised and brought up-to-date.

PLANNING

Recruitment and retention of suitable professional officers for the Land-use Planning Section has continued to be a problem. Five vacancies continued in this section over the last two years.

Regional plans

The Marandellas Group and Mazoe Valley Regional Surveys were distributed to the ICA Committees concerned, and will provide the basis for agricultural extension work and for forward planning. The Central Planning Team also produced surveys of the Copper Queen area—which was published—and of the Busi River catchment in the Chipinga ICA which was distributed to the committee members.

Following the training of staff at Mount Darwin, Mrewa and Rusape, progress is being made in the mapping of 230 farms in the Karuyana, Chesa and Tanda Purchase Lands.

Farm plans

Land-use Planning has in most areas been superseded by veld-management planning. Forty-three farm plans were completed in the European farming areas during the year.

Soil irrigability surveys

The Crowborough Municipal Farm was surveyed to determine the use of sewerage effluent from the City of Salisbury and a soil survey was undertaken to assess the irrigation potential below the Lesapi Dam in the Tsungwesi ICA.

Settlement surveys

Broad assessments to indicate the agricultural settlement potential of State lands were made in the Budjga and Chesa Purchase Lands, and in the Mtoko, Umfurudzi and Umsweswe ICA's.

Work study

Aspects of ground spraying in potato production were investigated at the request of the Potato Growers' Association. A similar investigation was made in relation to fruit spraying.

The Section also made detailed studies of methods of cane harvesting in the Lowveld and of pyrethrum production in the Marandellas area. A study of burley tobacco handling was started.

Farm management

Policy is to co-operate closely with the Economics and Markets Section of the Ministry and with the Rhodesia National Farmers' Union Management Recording Services in forward planning and budgeting in the light of cost data. In addition, many visits were made to prepare management plans at the request of farmers, field staff and the Agricultural Finance Corporation.

Standard cost curves were prepared to facilitate budgeting based on all recent M.A.S. and Econo-

mics and Market's data on tobacco, maize and cotton. These curves were drawn from electronically-computed data and only this method made it possible.

Farm-management records were processed for 45 Purchase Land farms, enabling gross margin information on crops and livestock enterprises to be extracted. This will provide more reliable data for subsequent amendment of Purchase Land viability criteria.

Data was collected during the 1970–71 year from 140 farmers. Section staff supervised the work of Extension Assistants in the handling of this data. Considerable farmer-interest exists for this service which could have been extended to some 500 farmers had processing facilities been available.

Yield data has been prepared for all ICA's for all crops on a seven-year-average basis, with co-efficient of variation to indicate degree of yield variability.

Data on season length and quality was prepared for all areas in Mashonaland and the Midlands and for parts of the Manicaland and Victoria provinces. This data provides information of ranges of season-lengths and averages, and season qualities applicable to specific areas. Such information provides the basis for crop planning operations and the selection of suitable varieties.

Crop investigations included studies of maize-grain losses between maturity and final harvest, studies to determine safe moisture levels for the bulk storage of seed cotton and investigations into cotton-handling methods including transportation.

Statistical mapping

Base maps have been completed for almost all areas, as were overlays depicting communications, water supplies and soil and vegetation types.

Veld-management plans

Provincial topographers devoted a large proportion of their time to the drafting of maps for veld-management plans, particularly in the Victoria Province where progress in European farming areas and in Purchase Lands has been exceptional. A steady demand for drafting work was made by the Ministry of Internal Affairs in this province.

FIELD SERVICES

Field staff activities

Many Provinces reported that personal visits to farms were largely in response to requests, either from farmers themselves of from such agencies as the AFC or FIF. Regret is expressed that little time was available for unsolicited visits which lead to progress among certain groups of the farming community.

The point was also made that success with other types of extension methods—such as group or mass methods—inevitably led to increased requests for follow-up visits to farms.

A general increase also occurred in the number of farmers who visited the Department's offices at district, group and provincial level. Such visits concerning specific subjects were part of the general extension process, and often the direct result of other activities.

In the higher-rainfall areas a large number of farm visits related to the mechanical conservation of arable land. Extension officer visits to individual farms is one of the most effective extension methods available to the Department.

One change in emphasis from previous years is the greater emphasis on Extension Programme Planning. Attempts were made to involve ICA committees in their formulation to the greatest possible degree, thus making these ICA rather than the Department's plans. Not all ICA committees are as deeply involved as one would wish, but it is hoped that this will change with the passage of time. All the indications are that Extension Programme Plans, worked out with precise objectives clearly defined, is very successful; greater meaning is given to the extension effort and a more valuable service is provided to the farming community. Such plans can concern mechanical conservation in an area, biological conservation, or productivity.

Much group extension was also done through the medium of discussion groups and field days. Some areas report that field-day attendance increased when subjects of interest to farmers' wives were included in the programme.

The provision of farm plans continued, as has the revision of old plans. Greater emphasis, however, is given to the provision of veld-management plans than in previous years. It is also pleasing to report that possibly uneconomic cropping practices are decreasing in many of the lower-rainfall areas where greater emphasis is given to the sound use of natural veld as the basis of agricultural production.

The need for a greater appreciation of the extension role of field staff, and for further efforts to reduce routine servicing functions which leave little time for true extension cannot be over-emphasised. The appointment of Conservation Officers has been very successful in relieving other field staff of some of this routine work load.

Farmers are showing a far greater appreciation of the need to investigate the economics of their

own farming enterprises. This led to a considerable demand for services regarding farm-management techniques and the general management of farming enterprises. Staff find it necessary to devote more unofficial time to this particular aspect of their extension duties.

Another change of emphasis, so far as extension duties are concerned, is the greater use of mass-media methods, the main channel being local ICA newsletters. Personally-addressed short advisory notes to individual farmers have proved most successful, and use has been made of articles in the national press. Although used by some individuals, field staff do not use radio and TV programmes as specific extension media.

CROP PRODUCTION

Tobacco—flue-cured

The season started well but many crops flowered under the slightly adverse conditions of a very wet November, followed by a very dry December. By mid-December much of the crop looked poor, but good rains in January and February redeemed the situation in the northern areas, where some excellent crops were grown. Generally, the quality of the lower half of the plant was good but upper reapings produced a disappointing proportion of slate, particularly on the highveld. Most growers filled their quotas and, for many, this was the best of several seasons.

An outbreak of tobacco vein-browning disease —Necrotic Virus—caused concern in the Arcturus area, and a resurgence of Bushy Top disease occurred in late-planted crops in the northern areas.

Burley

This was planted rather later than the flue-cured crop and grew well in all areas. White mould was widespread and was worse than for some years, whilst lace-worm damage was serious in the northern areas.

Unfortunately, the excellence of the crop in the lands was not matched by the curing facilities available; the result was a disappointingly large quantity of pale, field-cured tobacco. In the north, some pole-burn was initially experienced but farmers who had adequate curing facilities later produced some excellent tobacco. On the highveld, the rapid fall in humidity caused over-fast drying of much of the crop during curing.

The announcement of the removal of quotas and support prices for next year has not caused a rush into the crop. A few areas, particularly Centenary, will increase production but many growers intend to cut planting slightly and ensure production of quality leaf.

Cigar filler

The quality of this crop was rather disappointing and wild-fire was widespread.

Maryland

Quality was very disappointing, due to late planting and contamination with burley.

Fire-cured

Some reasonable crops were produced and demand is increasing.

Oriental

Some good tobacco was grown in Purchase Lands, but it is probable that two-thirds of the crop was not marketed. Demand for this crop is increasing so dramatically that there is no chance of its being satisfied this season.

Maize

In common with most seasons recently, the mid-season drought affected pollination and grain-filling, thereby reducing a bumper crop to an average one. Dry conditions badly affected the SR 52 variety in all areas other than the north of Salisbury where three-fifths of the crop is grown. In drier areas the variety R200 outyielded others and aroused considerable interest. Yields in excess of 7 500 kg/ha were common in the north of the country but fell to below 2 500 kg/ha in drier areas. Many farmers dry-planted, thereby ensuring pollination before the commencement of the mid-season drought.

Maize symposia held in the better rainfall areas have had a marked impact on planning for the coming season. It is expected that an increased area will be water-planted to ensure maximum use of rainfall.

Sorghum

Sorghum is now grown predominantly in Purchase Lands and in the middle and highveld areas; small acreages are grown by European farmers, but mostly for cattle feed in the drier parts of the country. The impact of the maize variety R200 may lead to less of this crop being grown.

Wheat

Wheat was grown almost exclusively as a winter crop in the Lowveld where average yields were 4 500 kg/ha—i.e. twenty-five per cent. higher than previous years. The exceptionally good yields obtained were due to the mild, dry winter and lack of frost. No reports of stem rust were received.

Barley

This minor crop is grown in the Manicaland and Victoria provinces under contract to maltsters.

Rice

A serious outbreak of Blast, *Piricularia oryzae*, in the Lowveld in the 1969–70 season led to a marked reduction in rice planting. A seed crop and two commercial crops were grown successfully.

Groundnuts

Early planting led to some good dryland yields but a large increase in planting is not expected. A major breakthrough was made in an irrigated-groundnut trial on heavy red soil in a higher rainfall area. The crop averaged 5 350 kg/ha from 11 hectares in the trial, compared with the farm average yield of 4 300 kg/ha.

A yield of 7 700 kg/ha was recorded at the Chiredzi Research Station, whilst a similar trial on a farm at Darwendale yielded 6 700 kg/ha. The increased price announced at the end of September will have little effect on the irrigated area planted during 1971–72 but is expected to induce increased production next year.

Soya beans

The weather during the past year was generally favourable and yields of 1 100 kg/ha were reported. The benefit from early planting is being increasingly appreciated. An increased area will be planted in the coming year.

Germination was poor due to late rains falling on ripening crops in the previous year. A survey showed that germination of two-fifths of the seed planted was below sixty per cent.

Oilseed competitions drew sixty entrants. These are to be continued in the coming year in collaboration with the Rhodesia National Farmers' Union.

Edible beans and peas

Most edible bean crops are grown on European farms for domestic consumption. A selection of edible beans are grown in Purchase Lands.

Green pea yields were low, due to late start to the season, heavy eelworm infestations and increasing Fusarium disease infestations.

Potatoes

The uncertified variety Montclare was prescribed owing to an outbreak of potato virus disease, which is also a disease of tobacco.

Late blight and tuber moth affected the seed-potato crop in the Eastern Districts. A survey into methods of spraying potatoes was conducted and findings were disseminated.

Cotton

The season started perfectly for cotton and germination was good. In mid-November rain fell in all areas and distribution was good until mid-January. February and March were dry months. Heavy falls in April and May were only of nuisance value. Herbicides provided satisfactory weed control. Farmers found that wider row spacing assisted cultivation and preparation, and speeded up planting and picking operations. The crop opened fast and reaping started in mid-April. Seed cotton quality was better than last year despite the late rainfall which led to some downgrading. Trials with chemical growth regulators are continuing; these are used by only a few farmers.

A shortage of harvesting labour in all parts of the country could lead to a reduction in the area grown. Two prototype suction reaping machines were tested on a farm scale but have not led to increased outputs. Pest control was quite good but the season may have been largely responsible. The main Red bollworm attack did not materialize until mid-March when the major growth of the crop was over.

A Cotton-production Methods Investigation proved most valuable as an extension aid in creating interest in pest control; a much larger investigation will be undertaken in the coming season. Cotton discussion groups were poorly attended, an increasing trend during the past two years.

Sugar cane

Cane production has been highly satisfactory but could have been better had rainfall been greater and better distributed. Work to reduce the smut incidence, the main disease of Lowveld cane, continues. Attempts are being made to reduce water use, both by implementing improved irrigation layouts, and by lining canals. The Department assisted farmers considerably in respect of the latter.

Sunflowers

The area planted to sunflowers remains fairly static; average yields of 1 300 kg/ha are attained.

Seed beans

Yields of seed-bean crops grown in the Lowveld average 2 000 kg/ha. A small area was affected by halo blight.

Horticultural crops

Deciduous fruit

An unusual winter in 1970 caused stone fruits to flower early in most areas. Different varities responded differently and delayed-foliation symptoms were widespread. The warm 1970 spring weather caused early maturing and all varieties cropped sooner than expected. The apple crop was severely reduced by hail damage. Large plant-

ings of conventional varieties continue. The entire pear crop was sold fresh; bumper yields were obtained in Melsetter. Canning pears were in short supply. Peach prices were reasonably good but the crop was not large. Canning peaches were affected by delayed foliation but yields were satisfactory, at approximately 80 kg per tree five years after planting.

The plum crop was not big but was well priced; a canning demand should lead to further expansion.

Apricots were small, split fruit being a problem. Better cultivars are needed to obtain varieties suitable for Rhodesian conditions.

Citrus

Citrus sold well. Small citrus growers all confirm a steady upward demand. Miniature packs selling at 10c have influenced the demand; these are particularly popular with Africans.

Viticulture

Successful top-working of vines in the field has led to a greater potential for the grape industry. Varieties better suited to a particular area can now be exploited to the full instead of growers having to carry a large number of unproductive vines as in the past. Irregular shooting occurred at the beginning of the season in Matabeleland; fruit-piercing moths and birds were a problem as the grapes ripened. Dry weather in January and February led to less mildew in drier parts of the country. Premature leaf drop due to other diseases occurred in lower rainfall areas.

Other fruit crops

Youngberries were extremely good and plantings are increasing; yields of over 4 500 kg/ha were achieved. Hail at Inyanga ruined the raspberry crop. Disappointingly low strawberry yields were due to Botrytis and severe insect attacks.

Nut crops

Macadamias attracted the interest of growers in the Eastern Districts and large plantings are expected; September blossoming was prolific. Grafted pecan trees are in short supply following fairly extensive plantings during the past year.

Young almond trees gave promising yields at Melsetter and blossoming was again good this year.

Vegetables

Although plantings did not exceed 10 hectares on any one farm, a considerable area of vegetables was grown in the 1970 winter in the Lowveld. The Limpopo ICA produced large quantities of tomatoes and cucurbits whereas onions were restricted to other parts of the Lowveld. Other than tomatoes which suffered from widespread late blight, yields were satisfactory.

Tea

The development is over-shadowed by coffee growing but areas planted are being increased. The most interesting development, and one which will stimulate production in the Chipinga district is the tea factory being built by two private growers. Tea companies fully recognize the need for irrigation and nearly 1 650 hectares are under sprinklers. Foliar-application trials—zinc sprayed from the air three or four times per season—increased yields by fifteen per cent. and boosted interest. Tea is slowly on the increase in the Chipinga Purchase Lands; forty hectares were planted and twenty hectares prepared.

Coffee

Dry weather between January and March caused severe stress to mature coffee and showed the need for irrigation and mulching. Although the crop was good, stress results will not show up until the coming year. Coffee land changed hands rapidly at relatively high prices and some 1 000 hectares are to be planted in the coming year. A combination of lower prices, disease, management failure and marketing difficulties will probably slow development. Further inhibitions will be the shortage of suitable land and irrigation water. Fusarium disease is still causing concern and the recent decision to control movement of coffee seedlings can only be to the benefit of the industry. Leaf miner and Cercospora disease still present problems, and hopes of aerial spraying proving to be an effective control are merely wishful thinking, and could be dangerous.

Fodder crops

Maize and sorghum are the main summer crops grown for silage, the standard winter feed on dairy farms in most parts of the country. The lucerne area remained fairly static, giving yields of 15 tonnes dry matter per hectare.

Other crops

Mushrooms are grown under intensive conditions and a Mushroom Growers' Association was recently formed. The area planted to pineapples increased. Cut flowers are grown commercially around Salisbury and Bulawayo.

LIVESTOCK

Beef cattle—General

In the low- and medium-rainfall areas, excluding the Victoria Lowveld a long winter was followed by an erratic summer and decreased summer mass gains. Slaughter results and conception rates were also adversely affected.

In the Mashonaland area the cattle population continued to increase as did stocking rates; much of Mashonaland can now be said to be fully stocked.

A swing from weaner production is reported both from high- and low-rainfall areas, and some small farmers are moving out of breeding. Summer fattening, both early-summer for the Chiller Bonus and late-summer, increased considerably and was generally economically successful.

Many farmers were adversely affected by the lack of strong demand for female weaner stock during the year.

Fattening

Summer fattening on grass, both spring and autumn, increased in popularity at some expense to pen fattening. The more stabilized stock population, combined with higher breeding productivity is bringing more young female stock forward for fattening and slaughter. Pen fattening young stock is still considered of marginal profitability and is often used merely as a marketing system.

Fattening in African areas

Total numbers fattened in the Purchase Lands remained about the same as in the previous year, although distribution changed within provinces. Victoria and Manicaland showed significant increases.

Dairy production

It would appear that the same farm problems continue to bedevil the dairy industry. Most areas report instances of insufficient silage and other roughage from September onwards, thus seriously hampering production. In the drier areas this is seen as a cropping problem, irrigation being a remedy, whereas in the Mashonaland and Manicaland areas it is seen to be the result of insufficient forward planning. In the latter case this is due either to insufficient areas being planted for fodder production, or to a dairy enterprise that is too big for the fodder potential of some smaller farms.

Sheep

The sheep population was further reduced in the farming areas, particularly in Matabeleland. In most areas, the majority of flocks are kept mainly as a source of domestic mutton and occasional pin money.

Demand for better grade lamb and mutton still exceeds supply around Salisbury, the main consuming area. This is reflected in the higher prices butchers will pay when lamb is sold to them direct instead of via the Cold Storage Commission; the position is less favourable in other areas except near Bulawayo where top lamb grades are still in short supply. The added burden of transport to CSC abattoirs makes the profitability of sheep production marginal to many producers, particularly when the disposal of old ewes is considered.

Profitable sheep enterprises are more frequent in the northern half of the country.

Dual-purpose sheep are holding their position in Mashonaland South and Manicaland where several farmers are augmenting their mutton and wool income by the sale of slaughter-lamb pelts which they sell as floor rugs or car-seat covers. The wool marketing position is still as unsettled as ever, although the Ministry of Internal Affairs is now making yet another effort to establish the Zuwa Weaving Centre at Inyanga. Two Inyanga farmers make and market their own rugs in competition with Zuwa.

Sheep-grazing management is a subject that has been high-lighted as a short duration grazing system problem. Sheep do not appear to fit in well with cattle in these systems and the general recommendation is that sheep be run in a separate rotation.

Pigs

Pig production is still the most profitable form of livestock production as far as the bigger and more efficient producers are concerned. In the Purchase Lands pig production standards are low, with notable exceptions.

Fish

The only commercial activity reported is the establishment of two additional trout-fattening enterprises in the Inyanga ICA. Generally, most farm dams are stocked and fished rather haphazardly.

Rabbits

The expected increase in production in the Marandellas area has not materialized due to the lack of steady markets. Good potential exists if such markets can be found. Otherwise rabbit production seems mainly an activity for YFC's and, on a limited scale, on a few farms and small holdings.

Beef performance testing scheme

No. of registered members 30.9.71	311
No. of farmers actively participating 9.10.70–30.9.71	125
No. of sets of data received—herds x years	351
No. of herds computer-processed	154
No. of animals computer-processed	13 359

The year has been one of rationalization and consolidation as well as development and expansion.

During the year 80 farmers have asked to be enrolled.

A rationalization exercise was run concurrently with the introduction of a new Weight-Return Sheet. Although well over 300 members of the Scheme were registered, many were inactive, and these were circulated to ascertain whether or not they wished to retain membership. Of the 120 replies received, 48 resigned, leaving 311 active participants.

It is significant that many stud breeders were among the 125 farmers who submitted data. This would indicate that performance selected breeding stock is now available, to the benefit of the national herd.

Although the rationalization resulted in a number of resignations, interest in the Scheme has expanded considerably. Since the introduction of the new Weight-return Sheet in May, 50 new members enrolled and renewed interest was shown by 67 previously inactive members.

The main development—the new Weight-return Sheets—were produced by the Government Printer with financial assistance from the RCPA. The co-operation of Government Printer staff is much appreciated.

Farmer reaction to the new forms has been complimentary and it is hoped that the improved layout will simplify data-collection and entry; the new forms have also simplified Head Office procedure.

Unfortunately, introduction was not without problems, one being a new computer-programme necessitated by the changed format. The Chief Biometrician was consulted at all stages of production but, due to staff shortages, he was unable to complete the new programme. A makeshift procedure was eventually adopted but the first analyses were not completed until early September. This processing delay is the major shortcoming of the Scheme, leading to dissatisfaction among farmers and staff embarrassment.

A further development during the year was the replanning and printing of the Calf-Performance Report booklet, which gives the Scheme a more professional appearance.

A new emblem was also designed to complement the retitled Scheme; while retaining the same concept, the design is simpler.

The electronic calculator provided by the RCPA is invaluable for hand-processing post-weaning data.

A pilot on-farm feedlot bull-performance test was undertaken with one breeder.

Bull approval scheme

The Bull Approval Scheme is operated jointly by Conex and the RRCBC. If, however, it is to fulfil its promise as a basically sound scheme aimed at improving the national herd it will need considerable overhaul. A meeting held in August proposed a modified scheme which may be implemented in time for next year's inspections.

Once buyers demand performance data relating to bulls and their dams, breeders will be obliged to fall in line. It is encouraging to see that some buyers are paying attention to performance data given in sale catalogues; far too many buyers arrive at the sale late, and consequently bid on animals as seen in the ring. A pro-forma sale catalogue and an article on bull buying and record interpretation will assist in publicizing both the Scheme and its objectives.

Livestock improvement committee

The following changes relating to stock inspections prior to export were adopted early in the year under review.

Registered stock—no inspection required.

Grade stock to be inspected by Breed Inspectors nominated by the responsible Breeders' Society or clubs who would report on the suitability of animals with regard to breed standards. Identification details to be included in the Breed Inspector's Report. Officers of the Department of Conservation and Extension are no longer concerned with these inspections.

In early March, 1971, the Livestock Improvement Committee decided to adopt the use of a "Letter of Intent" in relation to foreign exchange allocations for imports; this led to a more efficient use of funds.

On the 10th March, 1971, the Minister announced a relaxation of policy to permit export, to Moçambique only, of milk-tooth female stock, of any category.

CONCLUSIONS

As a result of resignations and transfers, staff turnover has again been large, both in the Professional/Technical and Administrative Branches. Over the years this has resulted in a loss of experience and an overall reduction in the average period of service in the Department. Until such time as stability can be achieved—which in the first instance is closely associated with conditions of service—there is little hope of achieving the satisfactory degree of continuity, vital to an effective extension service.

The Government Bursary Scheme is beginning to make a valuable contribution towards the provision of a regular flow of graduates to fill vacan-

cies. This will also very materially assist in re-establishing a better ratio of professionally to technically qualified officers which is necessary if standards are to be maintained.

The season was generally better than the last, although not an exceptional one. Farmers who are practising systems of farming which are in harmony with natural controls appear to be happy and are consolidating their economic position. Generally, the spirit among farmers is more positive, with less of the dragging depression current in previous years. The attitude of Government, and in particular the Ministry of Agriculture, has helped in that most thinking farmers realize their problems are recognized.

With the accent on farming efficiency to overcome the price-cost squeeze, the greatest problems facing farmers are costs of production and the high price of borrowed money. In assisting the farmer to overcome his problems, the importance and significance of financial planning and management at a high level cannot be over-emphasized; this highlights the importance of an adequate and dynamic farm-management service.

Once farms become more profitable, land-use and soil-conservation problems will, to a large extent, tend to disappear; hence the thinking that the Department's services should be more production rather than conservation orientated. Good farming is conservation farming.

The indifferent approach to conservation which has become evident in recent years has now changed into a deep concern for the deteriorating conservation position, resulting in a definite policy, and positive action to prevent, arrest and restore damage. This brought farmers, extension workers, the inspectorate and committee members together in the fight to conserve the soil.

From the viewpoint of biological conservation, good progress has been made. Farmers were quick to recognize the benefits of techniques which increase the efficiency of rainfall and reduce cost of production and erosion.

Water planting of maize, cotton and tobacco, and the use of minimum-tillage techniques have come to stay. These methods will in no small measure contribute towards greater stability of crop production, and the conservation and utilization of water and soil on a sound and sustained basis.

Although good progress has been maintained in veld-management planning, concern is expressed at the lack of correct implementation of many plans, and the failure on the part of many farmers to keep the necessary records. However, the breakthrough in veld management and the awareness created and maintained is most encouraging. Every effort will be made to ensure the successful implementation of plans to achieve maximum use of the natural veld on a sustained basis.

Extraneous and regulatory work continue to hamper and interfere with the work programmes of field staff. Farm visits continued to be the most effective means of extension contact, tending to increase as a result of field days and discussion groups. This indicates the need for an adequate coverage of extension field staff in relation to the number of farmers served per officer.

The response of an appeal to ICA committees to embark on programme planning positively and objectively, has been encouraging. In the light of the staffing position and the demands made on staff time, a need for close co-operation when planning programmes is more urgent and necessary than at any time in the past.

Criticism arose in certain quarters regarding the servicing of the farming community and the industry, but the Department persevered with its extension role in rendering services to the farmers of Rhodesia as a whole. With a view to providing the most effective specialist extension service covering conservation, land use, farm management and crop and livestock production, the Department is in the process of re-examining its role and organization.

I acknowledge gratefully the willing collaboration and assistance received from the Natural Resources Board, the Rhodesia National Farmers' Union, and all ministries and departments with which we have been associated in our work.

Finally, I wish to record my appreciation to all Conex staff—field, specialist and administrative—for their loyalty, devotion to duty, and the capable and responsible manner in which they have carried out their duties, often under heavy pressure of work and in trying circumstances. It is indeed pleasing to know that one is supported by people who place their jobs first and disregard the time of day when there is a job to be done, often in the face of unfair criticism and the pressure of excessive work-loads.

J. H. H. LOUWRENS,
Director of Conservation and Extension.

Visits to other countries

Name	*Purpose*	*Place*
Archibald, R. I. M.	Study irrigated crops	R.S.A.
Archibald, R. I. M.	International cotton pest control conference	Malawi
Barclay-Smith, R.	Special duties	Malawi
Beaumont, C.	S.A.R.C.C.U.S.	Swaziland
Buchanan, G. F.	Fruit production study tour	U.K.
Collett, W. E.	Oilseeds study	R.S.A.
Davies, T. S.	Irrigation study	U.K.
Gammon, D. M.	Free-choice mineral supplementation	R.S.A.
Gammon, D. M.	South African Society of animal production conference	R.S.A.
Hill, J. R. C.	S.A. grassland conference	R.S.A.
Thomas, D. R. C. Humphrey, K. Allison, G. A. Moxham, B. D. C.	Study of coffee, tea, nuts and veld management	R.S.A.
Ivy, P.	S.A.R.C.C.U.S.	R.S.A.
Ivy, P.	Investigate requirements of a soil conservation course	Angola
Kille, T.	Tobacco study tour	U.S.A., Italy and Switzerland
Naude, F.	South African Society of animal production conference	R.S.A.
Papadopoulo, Miss P.	Third Annual Symposium of the Federation of South African Beekeepers	R.S.A.
Robertson, W. R.	Annual conference of the Agricultural Economy Society of South Africa	R.S.A.
Spear, A. J.	S.A.R.C.C.U.S.	R.S.A.
Tornbohm, R.	S.A.R.C.C.U.S.	Swaziland
Tornbohm, R.	S.A.R.C.C.U.S.	R.S.A.
Wilson, G. J.	Water symposium	R.S.A.
Wilson, G. J.	Vlei-utilization conference	Malawi

Publications

Author	*Title*	*Publication*
Archibald, R. I. M.	Maize production in the Lowveld	Departmental
Archibald, R. I. M.	Seed bean production	Departmental
Archibald, R. I. M.	Wheat; an irrigation guide for the Lowveld	Departmental
Ball, J. S.	Planning and construction of ranch water supplies	*Stock and Crops*
Ball, J. S.	The design of stock watering schemes	*Stock and Crops*
Ball, J. S. and Pugh, A. O.	Practical Bilharzia control on irrigation schemes	*Modern Farming*
Barclay-Smith, R. W.	A few simple steps to better grading	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Hints on burley handling for the new grower	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Production practices for flue-cured next season. (In collaboration with the T.R.B.)	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Production practices for burley 1971–72 (in collaboration with the T.R.B.)	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	The season in Lomagundi—some curing problems solved	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Throughout the season in Lomagundi—burley growing	*Rhodesian Tobacco Journal*
Barclay-Smith, R. W.	Metricated man plants tobacco	*Rhodesian Farmer*
Bembridge, T. J.	A look at agriculture in the Netherlands	*Stock and Crops*
Bembridge, T. J.	An outline of agriculture of Western Germany	*Stock and Crops*
Bembridge, T. J.	Livestock production in Israel	*Stock and Crops*
Bembridge, T. J.	Study tour of Israel	Departmental
Braithwaite, P. G.	The use of grain augers	*Modern Farming*
Braithwaite, P. G.	Some preliminary findings on augers available in Rhodesia	*Rhodesian Farmer*
Braithwaite, P. G.	Making the best use of grain augers to convey grain both easily and quickly	*Rhodesian Farmer*
Bromley, K.	Rainfall, pentades, season length, and rainfall rockets	*Stock and Crops*
Buchanan, G. F.	Early flowering stimulation in canning peaches	Review article for *Rhodesia Agricultural Journal*
Buchanan, G. F.	Report on a visit to England	Departmental
Buchanan, G. F. and Cormack, D. B.	Report on a visit to South Africa	Departmental
Burgess, W.	Facts and figures	*Cotton Boll*
Burgess, W.	Test your soil to avoid rank growth	*Cotton Boll*
Collett, W. E.	Crops yield well in oilseeds competition	*Rhodesian Farmer*
Collett, W. E.	Irrigated groundnut recommendations	Departmental
Collett, W. E.	Soya bean germination and seed quality	*Rhodesian Farmer*
Collett, W. E.	Thinking of planting soya beans? cotton pickers can harvest your crop	*Rhodesian Farmer*
Cormack, D. B.	Irrigation of grape vines in a summer rainfall area	*Stock and Crops*
Cormack, J. M.	Efficient utilization of water through land management	*Rhodesia Agricultural Journal*
Davies, T. S.	Determining the system capacity of irrigation schemes	*Rhodesian Farmer*
Davies, T. S.	To determine the estimate capacity of flood irrigation schemes	*Stock and Crops*
De Jong, J.	Advantages of bulk handling of cotton on a farm scale	R.N.F.U.
De Jong, J.	Summary of maize harvesting methods used during the past season	*Rhodesian Farmer*
De Jong, J.	Potato spraying investigations	*Rhodesian Farmer*
De Jong, J.	Maize harvesting methods used by farmers last year	*Stock and Crops*
De Jong, J.	Work study on potato harvesting and other related operations (in three parts)	*Stock and Crops*
De Jong, J.	Advantages of semi-bulk handling of cotton on a farm scale	*Cotton Boll*
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De Jong, J.	Work study aspects of pyrethrum production	*Stock and Crops*
Donkin, D. J.	The Pratt cattle bail	*Kunzwa/Ukuzwa*
Donkin, D. J.	Supplementary feeds	Departmental
Donkin, D. J.	The safe use of urea by ruminants	*Rhodesian Farmer*
Donkin, D. J.	Urea as a protein source for sheep and cattle	*Rhodesian Farmer*
Donkin, D. J.	Commercial beef-cattle feeds	Departmental
Donkin, D. J.	Sheep production in Rhodesia	*Farming in Rhodesia*
Donkin, D. J.	Summer fattening of beef steers	*Stock and Crops*
Donkin, D. J.	Preparing cattle for shows	*Rhodesian Farmer*
Donkin, D. J.	Preparing sheep for shows	*Rhodesian Farmer*
Donkin, D. J. with de Jong, J. and du Toit, F. P. B.	Cattle handling facilities—interim recommendations	*Rhodesian Farmer*
du Toit, F. P. B.	The disposal of spent dipwash	*Stock and Crops*
du Toit, F. P. B.	The design of cattle handling facilities	*Rhodesian Farmer*
du Toit, F. P. B.	Cattle handling yards	*Rhodesian Farmer*
du Toit, F. P. B.	Cattle races and yard fencing	*Rhodesian Farmer*

Author	*Title*	*Publication*
du Toit, F. P. B.	Cattle bails	*Rhodesian Farmer*
du Toit, F. P. B.	Bulk storage and rapid despatch of maize from overhead silos	*Rhodesian Farmer*
du Toit, F. P. B.	Artificial crop drying: maize	*Modern Farming*
du Toit, F. P. B.	Modern farm building design	*Stock and Crops*
du Toit, F. P. B.	The search for improved burley curing facilities	Rhodesia Air Cured Tobacco Growers' Association
du Toit, F. P. B.	Metrication for farm structures	Metrication Council
Ellis, H. L. V.	What is all the fuss about wild oats?	*Rhodesian Farmer*
Ellis, H. L. V.	The green monster of the lake	*Sunday Mail*
Elwell, H. A.	Artificial waterways are necessary	*Rhodesian Farmer*
Elwell, H. A.	Mechanical methods of conservation in perspective	*Modern Farming*
Elwell, H. A.	The need for erosion surveys	*Rhodesian Farmer*
Elwell, H. A.	Conservation for schools	*N.R.B.*
Elwell, H. A.	Protection of dams during the rains	*Rhodesia Herald*
Elwell, H. A.	Do existing conservation methods meet the requirements of modern faming?	*Modern Farming*
Erasmus, A.	An investigation into the nature and causes of conservation problems in a typical high rainfall area of Mashonaland	*Modern Farming*
Futter, N.	Good planning—the secret to veld improvement	*Rhodesia Herald*
Futter, N.	Plant succession	Departmental
Gammon, D. M.	Performance recording for the Africander Cattle Breeders' Society of South Africa	*Rhodesian Farmer*
Gammon, D. M.	Beef production systems and livestock values	*Modern Farming*
Gammon, D. M.	Performance recording	*Africander Journal*
Gammon, D. M.	Report on Matopos field day	*Modern Farming*
Gammon, D. M.	Short duration grazing in the Lowveld	Departmental
Gammon, G. M.	Supplementary feeds	Departmental
Going, W. D.	Macadamia production in Rhodesia (in two parts)	*Modern Farming*
Going, W. D.	Pineapple production in Rhodesia	Departmental
Going, W. D.	Pruning grape vines	*Modern Farming*
Going, W. D.	Short notes on avocados	Departmental
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Hayward, J. W.	Maize production: realistic output costs	Advisory Notes 1/70
Hayward, J. W.	The functions and structure of the Tobacco Section of Conex	*Tobacco Forum*
Hayward, J. W.	Water planting of maize	*Stock and Crops*
Hill, J. C. R.	Metrication and veld management	*Modern Farming*
Hill, J. C. R.	Veld ecology	Departmental
Hope, R. J.	Techniques of insect scouting explained	*Rhodesian Farmer*
Howard, C. R.	Some observations on the results of maize drying investigations conducted by the Department of Conservation and Extension on behalf of the Rhodesia Grain Producers' Association Committee of the R.N.F.U. during 1970	for R.N.F.U.
Howden, R. H. G.	Potato growing	*Rhodesian Farmer*
Howden, R. H. G.	Edible beans	*Stock and Crops*
Howden, R. H. G.	Metrication and the cropping farmer	*Rhodesian Farmer*
Howden, R. H. G.	Potato growing in Rhodesia (in two parts)	*Stock and Crops*
Howden, R. H. G.	Rhodesian farming diary	*Stock and Crops*
Howden, R. H. G.	Should I plant wheat this winter?	*Stock and Crops*
Howden, R. H. G.	Summer potato growing 1971/72	*Rhodesian Farmer*
Howden, R. H. G. and Spiers, J. B.	Peach growing in Rhodesia	Departmental
Howden, R. H. G. and Joyce, M. J.	Potato growing in Rhodesia	for: Rhodesia Seed Potatoes Association
Ivy, P.	Land use planning investigations	*Rhodesian Agricultural Journal Digest*
Ivy, P.	Preliminary report on Conex bush control plots	Proceedings of Veld Management Conference
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Johnson, P.	Get a better estimate of barn weights	*Rhodesian Farmer*
Johnson, P.	Rainfall patterns and agriculture	*Modern Farming*
Jones, M. E.	Dr. McCannic's Casebook (Three articles in a series)	*Modern Farming*
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Jones, M. E.	Mechanical conveyors	*Stock and Crops*
Jones, M. E.	Is your tillage practice sending your soil off the farm?	*Modern Farming*
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Jones, M. E.	Harvesting and threshing of soya beans	*Rhodesian Farmer*

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Jones, M. E.	Aspect of performance and operating instructions for the Brockhouse contour ridger	Departmental
Jones, M. E.	Hammer some life into that hard seed	*Rhodesian Agricultural Journal Digest*
Jones, M. E.	Report on field investigations into harvesting and threshing machinery for soya bean and maize during the 1970 harvest season	for R.N.F.U.
Kemp, Mrs. P.	Peach ice cream	for R.N.F.U.
Kemp, Mrs. P.	Peach mousse	for R.N.F.U.
Kemp, Mrs. P.	Recipes for deciduous fruits	for *National Freshpikt Fruit*
Kennan, P. B.	Small discussion groups—a valuable extension technique	*Rhodesian Agricultural Journal*
Kennan, P. B.	Programme planning among European farmers in Rhodesia	2nd Scientific Congress, Umtali
Kille, T.	Burley tobacco	*Rhodesia Tobacco Journal*
Kille, T.	Use of insecticides on tobacco	*Tobacco Forum*
Kille, T.	Burley reaping and curing	*Rhodesia Tobacco Journal*
Kille, T.	Handling and curing tobacco	*Rhodesia Tobacco Journal*
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Kille, T.	Keep an eye on prices when burley grading	*Rhodesia Tobacco Journal*
Kille, T.	Reaping and curing	*Rhodesian Tobacco Journal*
Kille, T.	Recommended production practices for the burley crop (in collaboration with the T.R.B.)	*Rhodesian Tobacco Journal*
Kille, T.	Recommended production practices for the 1970 71 flue-cured crop (in collaboration with the T R.B.)	*Rhodesian Tobacco Journal*
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Kille, T.	Step by step throughout the growing season	*Rhodesia Tobacco Journal*
Kille, T.	White mould prevention in flue-cured and burley	*Rhodesia Tobacco Journal*
Locke, R. F.	Cotton growing for extension assistants	Departmental
Locke, R. F.	More about rank growth	*Rhodesian Farmer*
Maitin, P. E.	Drainage of irrigated land	Agricultural Handbook
Maitin, P. E.	Study tour of Israel	*Rhodesian Farmer*
McClymont, D.	Burley extension Bindura style	*Rhodesia Tobacco Journal*
McClymont, D.	Could you plant tomorrow?	*Rhodesia Tobacco Journal*
McClymont, D.	Don't fail on the floors	*Rhodesia Tobacco Journal*
Meikle, G. J.	Towards better tillage	*Stock and Crops*
Meikle, G. J.	Effective utilization of rainfall through common-sense tillage practices	*Rhodesian Farmer*
Meikle, G. J.	Is ploughing on the way out?	for: Ploughing Association of Rhodesia
Meikle, G. J.	Wheeltrack planting reduces soil erosion	*Rhodesia Agricultural Journal Digest*
Mitchell, R. J.	Colour photography—its use by Conex	*Rhodesian Science Journal*
Naude, J. F.	Bull approval	*Rhodesia Herald*
Naude, J. F.	Fattening of sheep	*Rhodesia Herald*
Naude, J. F.	Mineral nutrients	Departmental
Norton, J. D.	Veld management booklet	*N.R.B.*
Oliver, G.	A quick reference guide to plough setting	*Stock and Crops*
Oliver, G.	Train your tractor driver	*Modern Farming*
Papadopoulo, P. (Miss)	A guide to scoring of aparian products	Departmental
Papadopoulo, P. (Miss)	Adansonii bee	*American Bee Journal*
Papadopoulo, P. (Miss)	Apiculture Bulletin No. 4 Spring 1970	Departmental
Papadopoulo, P. (Miss)	Beekeeping for young farmers clubs	Departmental
Papadopoulo, P. (Miss)	Bees	Section of 4th Bundu Book
Papadopoulo, P. (Miss)	Beeswax	Departmental
Papadopoulo, P. (Miss)	Correct bee space	*Rhodesia Agricultural Journal*
Papadopoulo, P. (Miss)	Creamed honey	*The Bee Line*
Papadopoulo, P. (Miss)	Protecting colonies from ants	Departmental
Papadopoulo, P. (Miss)	Pyrethrum	*The Bee Line*
Papadopoulo, P. (Miss)	Queen mating in confinement	*Bee World.* Twelve monthly articles for *The Bee Line*
Pistorius, J. J.	Just how unreliable is our rainfall?	*Modern Farming*
Robertshaw, J. E.	Hampshire sets target—85% calving	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	How to build a poultry house	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	Fruit trees on your farm	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	Orchard layouts on small farms	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	Fattening mature cattle in pens	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	Veld management	*Kunzwa/Ukuzwa*
Robertshaw, J. E.	Soil fertility and erosion	*Kunzwa/Ukuzwa*
Robertson, W. R.	Preliminary report on maize loss investigations	*Rhodesian Farmer*
Robertson, W. R.	Economic aspects of risk and uncertainty in crop production	*Modern Farming*
Robinson, J. C.	Conex bush control demonstration plots	*Rhodesian Farmer*
Roblin, A. J.	Expansion in the Rhodesia beef recording scheme)	*Rhodesia Agricultural Journal Digest*

Author	*Title*	*Publication*
Stocks, J. L.	Why aren't our tobacco yields higher?	*Rhodesian Tobacco Journal*
Stubbs, A. T.	Introducing performance records into show judging	*Hereford Journal*
Stubbs, A. T.	Rhodesian Livestock Industry	Proceedings of Science Congress
Stubbs, A. T.	Beef cattle judging in the 70's	*Rhodesian Farmer*
Watermeyer, J. M.	Metrication in irrigation	*Stock and Crops*
Watermeyer, J. M.	Irrigated winter wheat—Bulletin No. 12	*Rhodesia Agricultural Journal* (co-author)
Watermeyer, J. M.	Metrication in irrigation	*Agricultural Handbook*
Watermeyer, J. M.	Metricated irrigation	*Rhodesian Farmer*
Williamson, G.	Water distribution	*Stock and Crops*
Wilson, G. J.	Irrigation test unit	*Stock and Crops*
Wilson, G. J.	Irrigation of wheat—I.C.I.C. report	*Stock and crops*
Young, J.	Biological control of insect pests	*Shamva Cuttings*

APPENDIX IIA

Radio and television broadcasts

Chiyoka, P.	Nhau dzevarimi	4 × 25 minutes—100 minutes
du Toit, F. P.	Labour domicile on European farms	12 minutes RTV
Elwell, H. A.	Conservation layouts	10 minutes
Elwell, H. A.	Conservation	5 minutes
Howden, R. H. G.	Agronomy	5 minutes
Kille, T.	Tobacco	4 × 5 minutes
Kille, T.	Tobacco	2 × 5 minutes
Mandisodza, K. T.	Nhau dzevarimi	48 × 25 minutes—20 hours
Meikle, G. J.	Work of Conex Engineering Branch and S.C.A.M.	10 minutes
Meikle, G. J.	Minimum tillage and its effect on soil erosion	7 minutes
Meikle, G. J.	How S.C.A.M. and Conex work together	5 minutes
Meikle, G. J.	Tillage for optimum maize production	5 minutes
Papadopoulo, P. (Miss)	Beekeeping	10 minutes
Robertshaw, J. E.	The future of *Kunzwa*	10 minutes
Robertshaw, J. E.	The Publications Officer post in Conex	5 minutes
Spear, A. J.	Machinery testing	2 × 10 minutes
Spear, A. J.	Tillage research	10 minutes
Spear, A. J.	Farm machinery testing	10 minutes
Stubbs, A. T.	N.R.B. Programme	15 minutes
Stubbs, A. T.	Farmers' Notebook	15 minutes
Watermeyer, J. M.	Metrication of water affairs in Farmers half hour	30 minutes
Wilson, G. J.	Water in Looking at Science	30 minutes

Imports—1st October, 1970 to 30th September, 1971

CATTLE

Breed	Bulls	Females	Calves	Total 1970–71	Total last year
Aberdeen Angus	4	10	—	14	10
Africander	24	36	—	60	515
Brahman	14	49	—	63	36
Charolais	17	23	—	40	23
Dexter	2	2	—	4	Nil
Friesland	5	10	—	15	14
Hereford	7	9	—	16	19
Jersey	2	24	—	26	2
Pinzgauer	6	—	—	6	Nil
Santa Gertrudis	4	12	—	16	14
Shorthorn	4	6	—	10	2
Simmentaler	23	124	37	184	503
South Devon	2	—	—	2	2
Sussex	5	4	—	9	11
Totals	119	309	37	465	1 151

SMALLSTOCK

Sheep	Rams	Ewes	Total 1970–71	Total last year
Black-head Persian	4	10	14	Nil
Dorper	6	3	9	62
German Merino	3	50	53	515
Suffolk	6	—	6	26
Van Rooy	3	—	3	Nil
Totals	22	63	85	603

Pigs	Boars	Gilts	Total 1970–71	Total last year
Landrace	1	3	4	3

Goats . . . . . Nil Nil 4

Exports—1st October, 1970 to 30th September, 1971

Breed	Registered		Grade		Total 1970–71	Total last year
	M	F	M	F		
Aberdeen Angus	2	—	—	6	—	12
Africander	24	35	25	1 283	1 367	1 007
Brahman	23	—	160	994	1 177	292
Charolais	4	3	6	41	54	Nil
Friesland	—	—	4	121	125	202
Hereford	9	36	18	270	333	181
Jersey	2	12	—	7	21	Nil
Nkone	—	—	1	3	4	Nil
Santa Gertrudis	4	—	—	11	15	5
Shona	—	—	20	36	56	Nil
Sussex	4	2	5	100	111	24
Tuli	9	—	—	—	9	53
Totals	81	88	239	2 872	3 280	1 776

APPENDIX IVA

Training

Courses run at the Salisbury and Domboshawa Training Institutes

No. of courses		Trainee/Training days	Participants	
			Conex staff	Others
Salisbury				
(*a*) Conex	13	840	169	22
(*b*) Internal affairs	14	1 057	—	213
Domboshawa	41	3 575	414	405
Totals	68	5 472	583	640

APPENDIX IVB

Training

Province	No. of courses	Attendance
Manicaland	132	1 433
Mashonaland North	33	249
Mashonaland South	20	403
Matabeleland	11	221
Midlands	23	124 (not including farmers)
Victoria	39	194
Total	258	2 622

APPENDIX V

Soil conservation

Province	Contour ridges and storm drains			Waterways pegged km	Roads pegged km
	Kilometres (km)		Area protected ha		
	Pegged	Constructed (estimate)			
Manicaland	1 419,3	774,9	4 384,2	28,8	32,0
Mashonaland North	6 954,8	6 657,9	51 752,5	198,6	147,5
Mashonaland South	2 569,7	2 215,2	11 327,2	80,0	42,0
Matabeleland	810,6	449,3	2 210,9	6,9	12,2
Midlands	502,3	429,3	2 166,9	73,5	58,8
Victoria	385,1	314,6	1 142,2	30,9	0
Totals	12 641,8	10 841,2	72 983,9	418,7	292,5

APPENDIX VI

Water conservation

1st October, 1970 to 30th September, 1971

Province	No. of dams and weirs constructed	Capacity in cubic metres (thousands) (1 000 m³)	
		Total	Average
Manicaland	76	2 098,1	27,6
Mashonaland North	81	6 177,9	76,3
Mashonaland South	28	3 665,7	130,9
Matabeleland	31	1 362,0	43,9
Midlands	37	1 543,8	41,7
Victoria	23	291,2	12,7
Totals	276	15 138,7	55,0

APPENDIX VII

Dams constructed under Conex supervision

Province	Farmers and contractors				Government unit earth dams	
	Earth dams		Weirs			
	No.	%	No.	%	No.	%
Manicaland	71	93,4	2	2,6	3	4,0
Mashonaland North	36	44,4	14	17,3	31	38,3
Mashonaland South	20	71,5	3	10,7	5	17,8
Matabeleland	25	80,6	2	6,4	4	13,0
Midlands	24	65,0	3	8,0	10	27,0
Victoria	16	69,6	4	17,4	3	13,0
Totals	192	69,6	28	10,1	56	20,3

APPENDIX VIII

List of critical trials conducted by the Department of Conservation and Extension during the 1970–71 season

	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Maize—variety	1					1	2
Maize—fertilizer			3				3
Soya bean—fertilizer	1	1					2
Wheat—fertilizer	1						1
Cotton—fertilizer			1				1
Vlei drainage			1				1
Fertilized pasture	1	1				2	4
Bush control	3	1					4
Amercide						3	3
Grapes—fumigation			2				2
Peaches—pernicious scale			1				1
Pecan nuts—grafting	1						1
Apples—dieback control	1						1
Peaches—delayed foliation	1			*			1
Groundnuts—high yielding		3	5				8
Herbicide trials						3	3
Totals	10	7	13	Nil	Nil	9	39

APPENDIX IX

Record of general extension work: Purchase Lands

Province	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Number of							
Master farmers	845	1 286	863	93	906	1 308	5 301
Master farmers qualifying during year	—	26	44	—	—	3	73
Master farmers in training	85	118	108	14	—	197	522
Co-operative farmers	1 240	820	538	587	845	787	4 817
Farm visits in use	1 350	1 702	1 123	600	1 170	1 760	7 505
Farmers using fertilizers	676	672	1 030	101	698	716	3 893
Farmer days	229	147	26	23	32	150	592
Farmers attending field days	5 082	10 012	3 848	406	2 230	10 198	31 776
Agricultural shows	14	4	8	—	3	3	32
Training centres in use	15	8	9	—	—	4	36
Training centres constructed during year	—	—	—	—	—	—	—
Tractors	77	375	163	20	30	48	613

APPENDIX X

Animal husbandry extension in purchase lands

	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	* Total 70–71	Total 69–70
Cattle in pens	1 075	Not available	464	39	15	1 144	2 737	2 743
Cattle marketed:								
Chiller I	5			1		18	24	25
II	21			8		4	33	97
III	32		21	6		68	127	160
GAQ	476		179	13	1	991	1 660	1 499
Total marketed	534		200	28	1	1 081	1 844	1 832
Grand total	1 609		664	67	16	2 225	4 581	
Total 69–70	1 096	663	1 031	89	246	1 399	4 575	

* Total for five provinces only.

MEETINGS ATTENDED BY CONEX STAFF

African Farmers Liaison Committee with the Ministry (Dir).
African Purchase Land local and group conferences (EOs & GOs).
Agricultural Assistance Board (A.D.(T)).
Agricultural Research Council Veld and Livestock Committee (SAHS).
Alvord Institute Training conferences (PC & EO).
Association of Scientific Societies of Rhodesia (PC & EO).
Bulawayo Agricultural Society (APC & EO).
Bull Approval Scheme (SAHS).
Burley Tobacco Growers' Association (S.Tob.S).
Cane Planters' Association (PC & EO).
Central African Standards' Association Technical Committee (CE).
Chibero College Council (A.D.(F)).
Chipinga Coffee Experiment Station Liaison Committee (PC & EO).
Committee on Co-ordination of Cloud Seeding Experiment (A.D.(T)).
Conex — R & SS — Beef Performance Testing Scheme (SAHS).
Conex Working Party on Handling Facilities (SAHS).
Cotton Growers' Association (A.D.(T)).
Cotton Research Policy Committee (CHO).
Crop Forecasting Committee of Controlled Products (S.Agron).
Crop Research Sub-committee of ARC (CHO).
Crop Variety Committee (S.Agron).
Deciduous Fruit Growers' Association (PC & EO).
Drought Relief Committee (PC & EO).
Executive Committee of the Irrigation Association of Rhodesia (CIO).
Executive Committee of the Rhodesia Beekeepers' Council (S.Apic).
Executive Committee of the Mashonaland Beekeepers' Association (S.Apic).
F.I.F. Committees (A.D.(T)).
Fertilizer Advisory Committee (CHO).
Forum Editorial Committee (CHO).
F.F.H.C. National Committee (A.D.(T)).
Government Civil Engineering Advisory Committee (SAE).
Government Liaison Committee with the Civil Engineering Industry (SAE).
Grain Competition Judges Committee (CHO).
Grain Research Policy Committee (CHO).
Grasslands Liaison Committee (PC & EO).
Gwebi College Council (Dir).
Inyanga Show Society (E.O. Inyanga).
Irrigation Co-ordinating Committee Victoria (APC & EO).
Lesapi Dam Committee (unofficial) (PC & EO).
Livestock Improvement Committee (Dir-Chairman).
Lowveld and Makoholi Research Liaison Committee PC & EO).
Lowveld Research Committee (CHO).
Manicaland Agricultural Society (PC & EO).
Manicaland Branch of the Ploughing Association (PC & EO).
Manicaland Publicity Association (PC & EO).
Mashona Cattle Society (SAHS).
Matabeleland Development Council (PC & EO).
Matopos Research Liaison Committee (PC & EO).
Metrication Council — Agricultural Technical Services Committee (S.Agron., A.E., T.O.).
Metrication Council — Pesticide Sub-committee (S.Agron).
Metrication Council—Publicity Sub-committee (P.O.).
Ministry of Agriculture—Beef Industry (SAHS).
Ministry of Agriculture –Exports (SAHS).
Ministry of Agriculture—Irrigation Development Committee (CIO-CPO).
Ministry of Agriculture—Publicity Committee (A.D.(T), P.O.).
Ministry of Agriculture — Sub-division Committee (CPO).
National Executive Committee of YF/NR Clubs (CTO).
National Resources Board (Dir).
N.R.B. General Purpose Committee (A.D.(F)).
N.R.B. Mineral Resources Committee (A.D.(T)).
N.R.B. Resources Education Committee (CTO).
N.R.B. Trophy Committee (PC & EO).
N.R.B. Wild Life Conservation Committee (A.D.(T)).
I.C.A. Committees (Field Staff).
Native Cattle Society A.G.M. (SAHS).
Odzani and Limpopo Irrigation Board (E.O. Umtali, Nuanetsi).
Oilseeds Research Policy Committee (CHO).
Oriental Tobacco Advisory Committee (S.Tob.S.).
Ploughing Association of Rhodesia (A.E.(F)—F.M.T.S.).
Potato Spraying Working Party (A.E.(F)).
Primary Development Committee (I.O).
Prime Minister's Conference (PC & EO).
Provincial & District Conferences.
R.A.J. Editorial Committee (A.D.(T)—CTO—PO).
Regional Committees of YF/NR Clubs (S.YES).
Rhodesia Cattle Breeders' Association A.G.M. (SAHS).
Rhodesia Crop Science Symposium (SFMS).
Rhodesia Crop Seeds Association Executive Committee (S.Agron).
Rhodes Inyanga Experiment Station Liaison Committee (PC & EO).
RNFU (Dir).
RNFU Monthly meetings.
Rhodesia Oilseeds Producers' Association Executive Committee (A.D.(T)).
Rhodesia Potato Producers' Association Executive Committee (S.Agron).
Rhodesia Recce Ecological Committee for the Conservation of the Environment (CTO).
Rhodesia Registered Cattle Breeds Council (SAHS).
Rhodesia Seed Potato Association Executive Committee (S.Agron).
Rhodesia Viticultural Association Executive Committee (Horticulturist).
Rothmans Grower of the Year Committee (CHO).
Rural Councils when requested (District staff).
SARCCUS (Dir).
SARCCUS Agricultural Engineering Sub-committee (CE).
SARCCUS Standing Committee on Erosion and Runoff (Control) (SAE).
SARCCUS Standing Committee for Extension and Education (CTO-Chairman).
SARCCUS Sub-committee on Land-use Planning and Farm Business Management (CPO).
Shamva Promotion Council (FMS & I.O. by invitation).
Sheep Producers' Association (SAHS).
Soil Balance Committee of the University of Rhodesia (SAE).
Soil Survey Liaison Committee (CIO–CPO).
Show Beef Competition Judges' Committee (S.Agron).
Standards' Association Committee on Aperian Products (S.Apic).
Standards' Association on Water Pollution (CIO).
Standards' Association Stockfeeds Committee (SAHS).
SCAM and Sub-committees (CE).
Standing Committee on Farm Mechanisation (A.D.(T)).
Standing Committee on Re-use of Effluents (CIO).
Stock Owners' Association (PC & EO).
Tillage Trials' Committee (A.E.(T)).
Tobacco Marketing Board (CHO).
Tobacco Research Board (Dir).
Tobacco Seed Association Executive Committee (CHO).
Tobacco Seed Association Technical Committee (S.Tob.S).
Tripartite Agreement Meeting on Seed Maize (S.Agron).
Water Reservations' Committee (CIO).
Weaner Committee (Headlands) (GO Rusape).
Wengi Proving Unit (PC & EO, member–GC & EO., Mazoe, Secretary).
Whisper Society A.G.M. (AHS).
Wool Marketing—Internal Affairs (AHS).
Working Party on Irrigation Drainage (CIO).
Working Party into Potato Spraying Methods (S.Agron).
YFC Council (S.YES).

Veld management

Systems planned by the Department of Conservation and Extension during the year ending 30th September, 1971

Province-Group-I.C.A.	Conex plans completed			
	Systems not operating		Systems operating	
	Plans	Hectares	Plans	Hectares
Short duration grazing				
Manicaland			66	39 430
Mashonaland North	29	47 687	61	107 216
Mashonaland South	78	48 778	70	64 834
Matabeleland			24	101 899
Midlands	94	216 183	96	347 024
Victoria			639	198 477
Totals	201	312 648	956	858 880
Other approved grazing system				
Manicaland	3	2 316	91	51 506
Mashonaland North	12	3 485	13	51 537
Mashonaland South	19	11 425	9	6 380
Victoria			74	38 305
Totals	34	17 226	187	147 728
Grand totals	235	329 874	1 143	1 006 608

Remarks: Total area planned: During year ending 30–9–71 = 1 336 482 hectares
Running total = 4 760 840 hectares
Total area in country = 16 473 493 hectares
Percentage planned to date = 28,9%

Farmer courses field days	
Number	Attendance
358	13 134

Annual Report of the Director of Veterinary Services

for the year ending 30th September, 1971

General

FROM the cropping aspect the past season has been a good one. A record maize crop was reaped, which, with improved yields per acre and a guaranteed price of three dollars per 200 lb. bag, was most satisfactory to farmers in the maize belt. The cotton crop was also a heavy one with record production from the African sector, and at a price in excess of seven cents per pound gave a reasonable profit margin. Wheat production was also a record, due mainly to yields in excess of twenty bags per acre. The producer received $6.58 per 200 lb. bag.

In the ranching areas in the southern part of the country rainfall was less favourable and erratic. Crops were as usual of doubtful value and in the more distressed regions heavy cattle mortality from poverty occurred; some 60 000 cattle died in the African areas of southern Matabeleland.

Disease summary

The country remained exceptionally free of serious epizootic disease. An outbreak of foot and mouth disease on Humani Ranch was confined to that property, and an incursion of African Swine fever on our north-western border was eliminated without extension to any other piggery. An increase in confirmed cases of rabies, from 52 in the previous year to 130 this year, has caused concern because no less than 76 of these positive cases were in jackals; only 31 cases were in dogs. Fortunately the north-western part of the country has remained entirely free of infection. Dog vaccinations continued at a high level—349 633 this year compared to 363 129 in 1970, and 310 000 for the two preceding years.

Good progress was made against our largest veterinary problem the tsetse fly menace. Control of other diseases was satisfactorily maintained as indicated by the new cattle census figure of 5 552 974 head, an increase of 344 745 on the previous year. The following figures give the number and percentage of the national livestock owned by Africans:

Cattle	2 843 977	51%
Sheep	497 651	60%
Goats	1 669 971	98%
Pigs	118 804	59%
Equines (mostly donkeys)	135 336	93%

Staff

Veterinary officers

The following table shows that for the first time since 1964 professional officer strength is nearing the establishment figure of 46. In fact, with one impending resignation and three new Rhodesian students joining in January 1972, the Department will lack only an experienced virologist.

	1964	1965	1966	1967	1968	1969	1970	1971
Establishment	40	40	40	40	46	46	46	46
Fixed Establishment	18	26	23	27	32	34	35	40
Provisional Transfer	7	5	4	2	1	—	—	—
Temporary Appointments	4	3	6	4	2	3	3	3
Vacant Posts	11	6	7	7	11	9	8	3

There is no lack of young veterinary graduates for the immediate future for, in addition to the three bonded students who will be recruited in January, we still have five Government assisted students in various stages of their training. Furthermore, fifteen other young Rhodesians are qualifying as veterinary surgeons but are not sponsored by Government. One veterinary officer was awarded his Fellowship for research on the role of game in the maintenance of foot and mouth disease infection, and a second received his Masters Degree in immunology. Two other veterinary officers are completing Ph.D. degrees on trypanosomiasis and schistosomiasis, and a third is taking a post graduate Diploma in bacteriology in Britain. Two more officers would like to take post graduate courses in the coming year. Prospects of maintaining and improving our diagnostic services are therefore very promising.

The recent salary review which was effective from 1st July, 1971 has been well received by the profession.

Training of animal health inspectors

The overall competence of the Department is due in no small measure to this excellent body of men, which now has an establishment of 114 posts. As a matter of routine they inspect more than twenty-six million cattle annually, which means that, on average, all cattle in the country are seen five times per year. In point of fact, some are seen less frequently whereas stock in foot and mouth disease prone areas are inspected every fourteen days, and cattle in trypanosomiasis areas have a routine monthly schedule of inspections. These inspectors operate from fifty offices throughout the country and administer all regulations made under the Animal Health Act. All recruits undergo an initial two week's induction course after which they are sent to Provincial Offices for practical training and instruction. Before being permitted to sit their qualifying examinations at the end of one year's service they return to the Training Officer for six separate weeks of one week of lectures and practical work. These officers, thereafter, together with experienced

African staff form the "ears and eyes" of the Department. Similarly in our Tsetse Control Branch, professional officers are supplemented with a like cadre of trained Tsetse Field Officers who operate from centres in tsetse fly infested areas. Because of the distances involved and lack of normal means of communication, these officers and certain Animal Health Inspectors are issued with radio transreceivers with which to report to base daily. Through these personnel the Veterinary Department is in very close touch with events in remote areas of the country.

The Training Section continues to make excellent progress under the able tuition of Mr. H. S. de Bruijn and his Assistant, Mr. H. B. Bezuidenhout. The culmination of several years of work was the printing of a "Handbook for the Use of Animal Health Inspectors". Mr. de Bruijn deserves our thanks and congratulations for this volume which achieves a fine balance between a practical manual and a reference book for owners of stock. It has been issued to Inspectors and to officers in other Government Departments who deal with livestock problems. A thousand extra copies were printed for sale to the public at $2 each.

The turnover of Animal Health Inspectors is unfortunately still excessive, with sixteen resignations during the year and one death.

Meat inspectors

The meat inspection staff are again worthy of high praise having handled a beef production year far beyond the predicted record number. This Branch now has four full-time supervisory veterinary surgeons including Dr. H. Thornton, the author of the "Textbook of Meat Inspection" which is used throughout the English-speaking world as the standard work of reference. With the completion of a third training course in August, 1971 we were able to fill our increased establishment of 29 meat inspectors. It will be necessary to run another training course in 1972 to enable the Department to staff the new Marandellas abattoir which is due for completion in late 1973. During the year four officers resigned, one retired and nine joined the service.

Tsetse Control Branch

The Assistant Director of Tsetse and Trypanosomiasis Control makes the following observations:

"It is customary to thank staff for their continued efforts during the year, but lest this be thought to be a trite observation it must be recorded that the task of withholding tsetse fly advances is taxing the present staff to the limit. Too much is being attempted by too few. If gains are to be made, or if new tsetse pressures arise, then more men, particularly field staff, and materials must be made available. The present staff can do no more than they are doing. Where sufficient resources have been provided, as in the Interterritorial Scheme for the Control of Tsetse and Trypanosomiasis in Southeast Africa, notable gains have been made.

During the year two glossinologist posts, a road construction supervisor and a cattle supervisor have been provided which have brought some relief. Two Glossinologists and thirteen Tsetse Field Officers have been appointed and one Glossinologist and eleven Tsetse Field Officers have resigned. It is difficult to retain staff who have to work and live under bush conditions".

Veterinary Research Branch

Following the retirement of Mr. G. J. Christie, Drs. A. Wilson and J. A. Lawrence were appointed Assistant Director of Veterinary Services (Research) and Chief Veterinary Research Officer respectively. This Branch is still in need of an experienced virologist, particularly because a new virology wing is nearing completion and much of the specialized equipment has been obtained or is on order.

The top stable block, which incorporates offices, laboratories and a large animal post-mortem room, received major renovation and the buildings are now in a presentable state. Funds have been provided for the erection of an isolation and post-mortem unit early in 1972. Now that the move to Hatcliffe has been definitely shelved some additional laboratories and offices are necessary.

Housing and office accommodation

The Department's Head Office moved to a new building in the Agricultural Experimental Station in December, 1970. The new accommodation, though somewhat restricted, is adequate for our immediate needs. The provision of a conference room is of great convenience to the Training Officer.

Our staff in Gwanda were fortunate in acquiring the spacious accommodation vacated by the Ministry of Roads when that Ministry withdrew from that centre. The composite Government building in Gatooma, in which we are due to reside, is making slow progress. Staff houses at Sinoia, Chipinga, Wankie and Karoi are among our more pressing needs. On minor works allocation our requests have received more sympathy and considerable improvements have been effected to quarters and offices.

Livestock

In spite of record cattle slaughter figures at Cold Storage Commission abattoirs and the loss of not less than 60 000 from poverty deaths in the

Matabeleland low veld, the national herd increased by 344 745 head of cattle during the year. For purposes of comparison increases in recent years were 430 480 in 1970; 296 059 in 1969 and 337 233 in 1968. The higher figure in 1970 is largely accounted for by the comparative absence of deaths from poverty during that season. The national cattle herd now totals 5 552 974 head. It is interesting to note that whereas the total for Matabeleland, including Gwanda area, increased by only 7 000 head, the increases in other provinces were 133 000 in Mashonaland, 96 000 in Manicaland, 63 000 in Midlands and 44 000 in Victoria. The wide discrepancy between Matabeleland and other provinces is due principally to 60 000 deaths from poverty. Unfortunately, until there is appreciable progress in the rehabilitation of the southern Tribal Trust Lands these deaths are likely to be a regular occurrence whenever rainfall is below average. These areas are overgrazed even in the best of years, and any aggravation of the position is fatal.

In the absence of any serious outbreaks of disease there was no disruption of the marketing of livestock. Nutrition continues to be the most important factor retarding even greater expansion of the industry. It is to be hoped that the increased interest in veld management, particularly the high density-short interval grazing system, will allow more stock to be kept without further deterioration of the veld. Although the standard of management has improved appreciably in recent years, it is in this sector that more progress must be made. Necessary prophylactic inoculations, intelligent use of anthelmintics and efficient dipping do not in many cases receive the attention that ensures a high level of management.

Beef cattle

Beef production has continued to be the most stable and encouraging farming enterprise. Profitability has, however, fallen progressively as costs beyond the control of the farmer have continued to rise. Government has indicated that it is reasonably confident of being able to authorise a rise in the price received by the producer early in 1972, but as the General Manager of the Cold Storage Commission rightly observes:

"It is really world market prices which govern our total revenue and the price we can afford to pay for our raw material". Certainly Rhodesia has a top quality article to sell and is able to fulfill the rigorous hygiene standards laid down by importing countries. The new Cold Storage Commission abattoir at Gatooma, which was commissioned in the latter part of 1970, is widely acknowledged as the most modern in Africa, and the new one planned to be operating at Marandellas by 1974 will be even better.

Last year the number of cattle slaughtered at Cold Storage Commission abattoirs rose by 28.3 per cent. and again this year a further increase of 19,6 per cent. is recorded. If the African-owned sector of the cattle industry would make a realistic contribution to the numbers coming forward for slaughter, instead of their present off-take of 4 per cent., another two abbattoirs would be needed immediately.

Dairy cattle

The production of fresh milk reached a record total of just over twenty-five million gallons. The trend in the country as a whole is indicated by the results of a recent survey of Matabeleland Province where it was found that although the number of dairy cattle held fell by 10 per cent. between 1960 and 1970, and the number of producers declined by no less than 41 per cent., total production during this period actually rose by 10 per cent.

Mastitis is the main disease problem in this industry. Fertility and unidentified abortions have also been of consequence in some herds. Good progress continued to be made with the compulsory tuberculin testing of dairy herds whose owners had declined to avail themselves of the voluntary testing scheme introduced initially in the early nineteen fifties. Compulsory testing also applies to any herd from which dairy produce (cream and butter) is sold. In all, 245 herds involving 19 430 head were tested. Examination of the carcases of slaughtered reactors confirmed infection in only two herds. In one of these infected herds twenty-one carcases showed lesions so the whole herd of 105 head was destroyed. In the other, lesions were found in only one carcase.

Sheep

An eleven per cent. reduction in sheep slaughtered at Cold Storage Commission abattoirs is accounted for by reduced imports of live sheep from a neighbouring territory and by private butchers offering higher prices than those paid by the Cold Storage Commission. A recent rise in the price being paid by C.S.C. should alleviate this decline.

Rhodesia as a whole is not a good country for sheep production. The higher rainfall areas are too wet for haired sheep and the seeds of some indigenous grasses present problems for the woolled breeds. Also, other than in the Lowveld, the grass gets too rank and is of low nutritive value. Flocks grazed continuously on planted pastures have been disappointing, and in some cases have suffered from goitre and unthriftiness. In the past many owners have had promising results from small flocks, but when these were increased

appreciably in the high veld, troubles multiplied disproportionately. In most cases these adverse results could be attributed to a massive build-up of internal parasites and failure of the owner to anticipate the increased challenge. In spite of the excellent vermicides now available, this still occurs but other factors sometimes also appear to be involved. The sheep flock invariably receives the last call on the owner's time, and the grazing pattern is too often left to the initiative of the "sheep piccanin".

Sheep numbers owned by Europeans fell by 33 000 but those owned by Africans rose by 18 000. Because of the preference Africans have for beef and poultry, and the lower price of these meats, the demand for mutton is relatively limited to the European consumer. The potential market at present prices is not far from saturation point but doubtless could be boosted—particularly of the price were more competitive.

Goats

Goat numbers rose by 51 000 and now total 1 705 000. Export markets are available for this type of meat although the practical difficulties of economically collecting thousands of goats of suitable grade has so far baffled even the most astute operators. Beef export abattoirs are not prepared to deal with goats, and private abattoirs lack the necessary chilling and freezing facilities. In addition, the Department could not give the necessary veterinary certification for animals slaughtered in premises where we do not operate. Meanwhile, the goats continue to aggravate a desperate grazing position in the Tribal Trust Lands.

Pigs

Pig slaughtering in Cold Storage Commission and Colcom abattoirs dropped by 12,3 per cent. This was due mainly to a reduction in the numbers from African owners. Direct sales to butchers were possibly a factor.

Colcom have started building their new factory in Bulawayo, and this promises to be a model plant, incorporating a number of excellent design features. Veterinary requirements have also been met in full.

Colcom are extending the canning side of the Salisbury factory and this will relieve much of the congestion that has caused concern in the existing processing area.

Poultry

The quality of our stock is widely recognised and is in demand by neighbouring countries. The industry is increasingly being taken-over by large concerns and this is viewed with apprehension by the smaller independent producer. High quality dressed chickens at 25 cents or less per pound and eggs at similar prices per dozen are plentiful.

The country has, fortunately, remained completely free of Newcastle disease, although this virulent virus is regularly reported in adjacent territories. To enable producers to maintain a high level of immunity in their flocks at reasonable cost, the Department agree to allow the use of B1 type strains of live Newcastle disease virus. The cost of inactivated (dead) vaccine os $11,00 per 1 000 doses, whereas the live attenuated B1 vaccine retails ot $1,20 for a similar amount.

Rabbits

Rabbits do very well in this country if the husbandry is adequate and their fertility has never been suspect. There is a good export demand, but breeders lack cohesion and an organised marketing channel.

Chinchillas

Chinchilla breeding has lost much of its glamour with the recession in prices. It is mostly in the hands of inexperienced people and beset with marketing and management problems. Enteric conditions can cause severe losses.

Game ranching and safaris

Fortunately an element of sanity prevailed before some game-croppers and biltong-hunters shot themselves out of house and home by selling a valuable natural resource as rations for Africans. The new outlook of utilising game for photographic and mini-safaris or for sport hunting by wealthy visitors is most commendable. We accept that localised surplus numbers of certain species have to be reduced in the best interests of the animals themselves and their habitat but, except in the case of impala, this is not a problem on privately owned land. The culling of 1 300 and 600 elephant respectively in Wankie and Gona-re-Zhou was carried out by staff of the Department of National Parks and Wild Life Management with a minimum of disturbance.

BORDER CONTROL

Lundi–Limpopo game fence

This 110 mile game fence of ten strands of high strain steel wire on 7½ foot hard wood poles was erected in 1962, and has had a most significant effect in eliminating the incidence of foot and mouth disease outbreaks in that corner of Rhodesia. The fence is well maintained and continuously patrolled by resident guards. It is supplemented by a parallel cattle fence from the Limpopo to the Nuanetsi River thereby ensuring a stock-free corridor along this sector, where the greatest danger of contact existed.

Provided game fences do not exclude elephants and buffalo from reasonable access to water, the animals quickly adapt themselves to the presence of the wire and, thereafter, do very little damage.

Kazangula game fence

This 110 mile fence stretches down the Botswana border to Panda-ma-Tenga, and across to the Lobangwe River. It breaks contact between our stock and game from Botswana and prevents to and fro movement of game between Wankie Park and the Matetsi area. That part of the fence which runs from Panda-ma-Tenga to the Lobangwe River, known as the Lobangwe Game Fence, will be removed when the game fence along the railway line (Lobangwe to the Zambezi) is constructed in accordance with the recommendations of the Matetsi Commission. There will then be no hindrance to the movement of game from Wankie National Park into the Matetsi area. The removal of the Lobangwe fence is, however, also conditional on the removal of all cattle, except the odd household milk cow, from the Matetsi area. This is a precaution against the spread of foot and mouth disease by minimising contact between game and cattle.

Cattle fences

Numerous strategic foot and mouth cattle fences in the low veld were well maintained. The barbed wire on the Botswana border fence (Plumtree to Beacon 171) is being progressively renewed and a good road has now been constructed along this sector.

Quarantine camps

In recent years extensive development in the Victoria low veld and improved lines of transport have meant a change in the pattern of cattle movements. To cater for these the Department relinquished Government No. 3 Camp and is in the process of acquiring a new site at Mbizi Siding in place of the Nuanetsi River Stock Reserve. Improved quarantine facilities at Bulawayo have also enabled us to make more use of that centre in preference to Plumtree.

Tick life and dipping

The Department has made very strenuous efforts to reverse the steady deterioration in tick control which has been regularly reported during these last few years. Owners of cattle found to be tick infested at sales or even showing evidence of recent tick infestation have been severely dealt with and special attention has been given to farms with a history of theileriosis or brown tick activity. The Department is particularly appreciative of the strong support invariably given by the Rhodesian Cattle Producers' Association and other sectors of the Rhodesia National Farmers' Union. There is certainly increased interest in efficient tick control and now that lists of tick-infested properties are published monthly in the Rhodesian Farmer, reputations are not so easily concealed.

We also have pleasure in acknowledging the support received from Senior Staff in the Ministry of Internal Affairs. These gentlemen are aware of certain deficiencies in the service given to African owners of cattle but are making conscientious efforts to rectify matters. Money with which to build the necessary new dipping tanks, maintain existing facilities and pay supervising staff is, of course, the basic problem. The dipping of African-owned cattle has always been heavily subsidised from the African Development Fund. The position is now aggravated by a considerable rise in the cost of arsenical dips, and by the gradual emergence of tick strains which have an appreciable tolerance if not resistance, to arsenical dips. In some areas, dipping at the prescribed interval in the correct strength of arsenical dip does not give efficient tick control. This position is not improved by the fact that water supplies at many dips are inadequate to continue dipping for the prescribed period. When an excessive tick population is established because of the above factors, or because of drought and poverty, it is difficult to regain control with arsenical dips. We have, accordingly, recommended that the Ministry of Internal Affairs change to a phosphatic dip for the foreseeable future. This recommendation is being adopted in most areas, in spite of the fact that, by so doing, expenditure on dipping fluid will be more than trebled. Acceptance of such a heavy commitment indicates the good faith and honest endeavour of that Ministry in this respect. The Ministry, however, cannot be expected to carry all of the increased expenditure, so an appropriate rise in the present dipping fee of 30 cents per beast per annum must take place.

On our part we have given all possible assistance in the training of Internal Affairs supervisory staff. With their co-operation, meetings were held in all provincial centres at which all Provincial and District Commissioners were present. The following is a brief summary of assistance given by our Training Officer:

"Instruction in tick control has also been given to Chiefs, Headmen and members of African Councils. It is pleasing to report that this has been well received and requests for more such courses have resulted in a series of country-wide courses embracing all council areas being embarked upon. These will keep the Assistant Training Officer and myself fully occupied until the end of February, 1972. The following courses were given:

11 x 1-day courses for District Commissioners and District Officers attended by 48 D.C.'s and 52 D.O.'s.

8 x 2-day courses attended by 140 Primary Development Officers and Field Assistants.

16 courses for Dip-Attendants — attendance, 248.

10 courses for Councillors—attendance, 156.

7 courses for Chiefs and Headmen—216 members attended.

Talks on tick control were given at five field days. In addition Dr. Chavunduka ran 5 x 5-day courses for African farmers at Domboshawa, attended by 155 farmers".

Quarantine orders for tick infestation

In my Annual Report in 1972 I hope to report an appreciable improvement on the following figures:

	European-owned properties	*African areas*	*Total*
1970–71 . .	1 003	1 458	2 461
1969–70 . .	971	1 094	2 065

Contraventions

	Prosecutions (persons)	*Total fines* $
Cattle Cleansing Regulations .	1 469	11 031,50
Movement of Cattle Regulations	89	820,00
Rabies Regulations	737	3 775,00
Trypanosomiasis Regulations .	69	1 127,00
Stock Register Regulations . .	92	279,00
Animal Health Act	219	2 123,00
Curelty to Animals Act . . .	46	511,00
Trespass Quarantine Camp . .	1	4,00
Foot and Mouth Regulations .	3	90,00
Foot and Mouth various fines by Chief's Council		1 121,00
Total 1970–71 .	2 725	$20 881,50
1969–70 .	2 750	$18 784,00

Cattle inspected

	European	*African*	*Total*
Salisbury . .	2 211 297	1 962 107	4 173 404
Bulawayo . .	1 265 201	3 534 015	4 799 216
Umtali . . .	637 585	2 099 905	2 737 490
Gwelo . . .	1 169 744	2 003 830	3 173 574
Victoria . .	3 065 333	3 366 284	6 431 617
Sinoia . . .	1 377 830	522 138	1 899 968
Gwanda . .	852 971	1 519 404	2 372 375
Chipinga . .	185 629	1 110 826	1 296 455
Total 1970–71	10 765 590	16 118 509	26 884 099
Total 1969–70	8 860 829	15 331 306	24 192 135

Cattle sales

European-owned cattle: The number of auction sales in European areas increased from 529 to 565, and cattle sold from 223 386 to 230 252. Prices of slaughter stock were maintained, but there was less demand for young cattle. Efforts to dispose of surplus young breeding heifers by export met with only limited success.

African-owned cattle: During the year 709 weight and grade sales were held by the Ministry of Internal Affairs, an increase of 37 sales on the number for the previous year. In spite of this only 95 040 cattle were sold, an increase of 298 head. The extra expense involved and time wasted by affording these additional opportunities can be imagined because the following officials have to attend:

Internal Affairs—D.C. or D.O., Sales Clerk, Field Assistant or Primary Development Officer, Grader and African Messengers.

Veterinary—Animal Health Inspectors.

Cold Storage Commission—C.S.C. Buyer.

Auctioneers—Auctioneer and Pay Clerk.

Buyers—other than C.S.C.

These official weight and grade auction sales are surely one of the fairest and most convenient methods of sale to be found anywhere in the world. The facilities are excellent. Each animal is graded and stands on the scale while bidding takes place, there is a minimum floor price for all reasonable stock and the owner can accept or decline the bid before the animal leaves the scale. Saleyards are almost invariably within a day's walk of every owner and, were it not for these, the African would be at the mercy of itinerant speculators, whose price would obviously allow for having to drive the animal a hundred miles or more to an abattoir. From the veterinary aspect these organised sales are also ideal, in that all cattle in the Tribal Trust Land are inspected during the week prior to the sale. Animals being sold are seen again at the saleyard, and there is one large movement out of the area instead of a continuous series of minor ones.

With all this assistance, it is most depressing to have to comment annually on the reluctance of the African to sell his stock. This year on organised sales they sold 95 040 head out of a total African holding of 2 843 977, i.e. 3,34 per cent. Even allowing for other sales under section 6 permits, which last year totalled 3 500 head, the off-take is no more than 3,5 per cent. This year a comparatively localised drought accounted for 60 000 cattle deaths. It is well known that severe droughts in this part of Africa are not rare and it is not unrealistic to predict the loss of two or three hundred thousand head of cattle if the next severe drought affects the whole country.

If a conservative value of $40 per beast is placed on the 60 000 head that are known to have died from poverty this year, the African owners lost $2 400 000 in cash and the country was deprived of what those cattle would have realised had they passed through an abattoir. In fact the

loss is much greater, for it is impossible to assess the extra damage the cattle did to the over-grazed land.

The following table shows the number and percentage sold in each district:

District	Total African cattle	Sold	% 70–71	% 69–70	% 68–69	% 67–68	% 66–67
Salisbury	566 796	6 479	1,14	1,32	1,725	1,857	1,63
Bulawayo	498 267	25 570	5,13	4,25	3,534	3,45	3,83
Umtali	388 189	6 087	1,56	2,08	1,602	1,42	1,67
Gwelo	478 569	10 291	2,15	2,66	1,659	1,81	1,75
Victoria	532 856	25 112	4,71	4,27	5,189	4,71	2,49
Sinoia	91 486	581	0,63	0,75	0,660	0,84	0,19
Gwanda	224 043	16 910	7,54	9,59	8,923	8,561	8,32
Chipinga	63 771	4 010	6,29	7,66	9,342	7,19	3,16
Total	2 843 977	95 040	3,34	3,47	3,566	3,174	2,88

1969–70 . 2 729 586 head—94 762 sold—3·47%

SPECIFIED DISEASES

Viral diseases

Foot and mouth disease: Infection was confirmed on Humani Ranch, Chiredzi District, in the dairy herd and two tame sable on 7th March, 1971.

The origin of infection is unknown. It may, however, be related to seven buffalo, eight eland and two sable which were captured on the Mkwasine River in September, 1970. Probang samples from the seven buffalo had been taken in November, 1970 and had been sent to Pirbright where they were held in deep freeze at the time of the outbreak. When the disease was reported to Pirbright, the serum samples were processed and the presence of SAT I virus was confirmed in two of the samples. Sera from this group of buffalo were then collected (March, 1971) and dispatched to Pirbright. That laboratory subsequently reported positive titres to SAT II virus in four animals and titres to SAT I virus in two others. The exact significance of these findings cannot be assessed. There was also an indefinite history of the viscera of an impala having been fed to the pigs in sties adjacent to the dairy herd. These pigs also showed lesions but whether they were infected before or after the cattle is uncertain.

The buffalo and eland showed no lesions throughout, but the two sable had sever foot lesions and one subsequently died of secondary infection and liver abscessation. Samples of vesicular fluid from the infected sable and cattle were both typed as SAT II.

Infection was confined to two paddocks near the homestead, which contained 323 cattle, 74 sheep, 20 pigs and the above-mentioned tame game animals. These cattle, sheep and pigs were virused (inoculated with natural virus). The following stock on the remainder of Humani and surrounding properties were vaccinated with SAT II inactivated vaccine (Burroughs Wellcome):

Humani Ranch	3 559	cattle
	1 083	sheep
	891	goats
	9	pigs (African)
Angus Ranch	5 715	cattle
Devuli Ranch	19 665	cattle
	30 922	animals

The cordon was lifted at the end of April and Humani Ranch remained in quarantine and under regular inspection.

There was no sign of infection in the immunized cattle during March, April, May and until 22nd June, 1971 on which date the disease was seen in 15 head of cattle in a paddock adjacent to the original infection. It would seem that the infection was smouldering in wild game until such time as the temporary immunity conferred by the single vaccination of the surrounding stock had fallen sufficiently to permit active SAT II infection again to become established in the cattle.

Commencing on 30th June, 1971 all stock on the ranch and two small subdivisions were virused as below:

Cattle, 4 204; sheep, 1 552; goats, 935; pigs, 14.

On the same date, 30th June, 1971 all available 900 doses of SAT II vaccine were used to give some adjacent cattle a booster inoculation. By 7th July, 1971, supplies of polyvalent vaccine had been received and a further 26 799 head of cattle were revaccinated. No further extensions of the disease occurred, and cordon was lifted at the end of August.

Following a report of active disease inthe Caprivi Strip some twenty kilometres from our border all stock on the Matetsi farms were vaccinated with inactivated SAT II vaccine. These numbered 5 158 cattle, 343 sheep, 709 goats and 40 pigs—total 6 250 head.

The annual vaccination of the 50 407 head on Liebig's Ranch was carried out for the sixth successive year.

Rabies: The rabies position deteriorated significantly in that 130 cases of rabies were confirmed as against 52 last year. This was due to a sharp increase in the incidence in jackals—76 cases this year and 10 last season. Considering the excessive number of jackals to be found in many areas it is surprising that the position is not worse. Considerable assistance was received from Officers in the Department of National Parks who spent weeks on control operations in the most actively infected areas. On one farm no less than 18 jackals were poisoned. It is quite obvious that to be really effective jackals must be eliminated by

the land-owners themselves. We believe that this would also have a favourable effect on the number of game birds (guinea fowl, pheasants and partridges) that would survive.

Positive cases in jackals

1964	Nil	1968	12
1965	6	1969	Nil
1966	124	1970	10
1967	78	1971	76

Positive cases and species affected (1970–71)

Cases in the previous year are given in brackets.

Dogs	31 (20)	Duiker	1 (–)
Jackals	76 (10)	Hyaena	1 (–)
Cattle	10 (10)	Skunk	1 (–)
Cats	5 (1)	Humans	1 (–)
Mongoose	4 (7)		

Total: 1970–71, **130** 1969–70, **(52)**

In view of the considerable challenge from the above rabid wild animals, the level of immunity in dogs can be considered as very good.

This year 349 633 dogs were vaccinated as against 363 129 in 1970 and 310 155 in 1969. No cases of rabies have occurred in the north-western part of Rhodesia since 1957.

Rabies vaccinations

District	*European*	*African*	*Police dogs and cats*	*Total*	*Brain specimens*	*Positives*
Salisbury	9 389	70 727	136	80 252	201	33
Bulawayo	8 413	58 862	37	67 312	114	22
Umtali .	2 013	44 588	—	46 601	77	19
Gwelo .	4 281	58 589	—	62 870	43	2
Victoria .	936	45 471	—	46 407	30	6
Sinoia .	1 337	15 157	—	16 494	19	—
Gwanda .	316	15 425	—	15 741	10	—
Chipinga	667	13 289	—	13 956	94	48
Total .	27 352	322 108	173	349 633	588	130
1969–70	21 420	341 595	114	363 129	304	52

Total dogs vaccinated: 3 926 013
Total positive cases since 6–9–1950: 1 820

Confirmed cases since 6.9.1950

Aardwolf	3	Humans	31
Baboon	2	Hyaenas	3
Badger	4	Jackals	451
Cats	39	Leopard	1
Cattle	108	Meercat	4
Civet Cat	4	Mongoose	26
Dogs	1 106	Pigs	5
Donkeys	1	Rattel	9
Duiker	4	Sheep	10
Horses	3	Skunk	4
		Squirrel	2
	Total	1 820	

By using the fluorescent antibody technique a result is usually available in $1\frac{1}{2}$–$2\frac{1}{2}$ hours of the brain being received at either the Bulawayo or Salisbury Veterinary Laboratories. This test gives an accuracy of 95 per cent. Results are subsequently confirmed either histologically or biologically or by both methods where there is doubt or human involvement. 592 brain specimens were received and 578 carried through to the biological test stage.

Contagious epididymitis and vaginitis

760 bulls were examined for this condition and eight animals were considered to be positive. Two ranches remain in quarantine.

Lumpy skin disease: Mild cases occur sporadically in most provinces. There has been no evidence of the virulent Neethling strain for several years.

African swine fever: Infection was confirmed on Paradise Ranch on the Zambezi River in the Wankie district in March. Ten pigs had died during the previous five days. The remaining fifteen head were destroyed and burnt along with the wooden pens. Compensation at 22 cents per kilogram live weight amounted to $212. The owner is somewhat disillusioned with pig breeding since, just before infection struck, one pig was eaten by a leopard and another by a crocodile.

Fortunately there had been no pig movements from the property in the previous three months and infection was easily contained. The disease probably originated in warthog, which are plentiful in that remote area, and could have made contact with the domestic pigs which were allowed free range.

Rift Valley Fever: This disease was not diagnosed during the year under consideration. The last known case was in May, 1970. Sales of vaccine dropped from 967 710 doses to 230 610 doses.

Mucosal disease: Sporadic cases are suspected in most provinces. In Matabeleland the condition was diagnosed on nine properties. Mortality was low but morbidity fairly high. Conversely, in the Midlands area, seventy-three head succumbed on the seven farms involved.

Newcastle disease: There has been no evidence of this disease in Rhodesia since a small outbreak, introduced by imported poultry, was eliminated in October, 1968.

Bacterial diseases

Anthrax: The disease was confirmed in only one bovine animal, but it is believed that four other cattle, which died at the same centre a few days earlier, had also succumbed to this condition. These four deaths were not reported at the time and the carcasses were consumed by the African owners. Shortly afterwards fifteen of these contracted anthrax, one of whom died. A juvenile in

another Tribal Trust Land developed an anthrax carbuncle without serious effect.

In accordance with normal policy the following domestic stock at these places were vaccinated by Departmental staff. These free vaccinations will be repeated annually for the next three years:

Cattle	18 925
Sheep	721
Goats	8 738
Donkeys	779
Pigs	2
Total	29 165

Tuberculosis:

Imports Tested — 437 cattle

Exports Tested — 4 299 cattle and 12 pigs.

No lesions could be found in the carcase of the one animal which reacted.

Dairy cattle

Herds tested during the year:

District	*Herds*	*Total*	*I/Rs*	*Reactors*	*Passed*
Salisbury	54	4 679	16	—	4 663
Bulawayo	87	7 658	43	2	7 613
Fort Victoria	4	465	7	2	456
Gwelo	41	3 870	27	64	3 779
Umtali	13	872	5	—	867
Sinoia	37	1 533	11	—	1 522
Chipinga	9	353	6	—	347
Total	245	19 430	115	68	19 247
1969–70	366	23 046	127	50	22 925

Examination of the carcases of slaughtered reactors confirmed infection in only two herds. In one herd, twenty-one carcases showed lesions so the whole herd of 105 head was destroyed. In the other, lesions were found in only one carcase. Compensation is assessed on a sliding scale rising from 30 per cent. to 60 per cent. and the owner receives the carcase value, if any. Total compensation paid amounted to $5 741.

Ranch cattle

The annual tuberculin test of cattle on Liebig's Ranch was again carried out, revealing 237 reactors in the 32 319 head tested. Only 23 head (10 per cent.) of the 237 carcases showed lesions when examined at the abattoir. The number of no-lesion reactors is bound to rise as the degree of infection on the ranch decreases.

Meat inspection incidence

Centre	*Generalised*	*Local*	*Total head*
Salisbury	0	0	0
Bulawayo	19	37	56
Fort Victoria	1	2	3
Gatooma	0	0	0
Umtali	0	0	0
West Nicholson	0	0	0
Total	20	39	59
1969–70	16	42	58

Total cases remain virtually unchanged, and only two centres were involved. Of the 56 cases in Bulawayo, 29 were reactors or inconclusive reactors from Liebig's, 21 were from Marjoriebanks, Gwelo, two were from Liebig's under new ownership, three were from sales close to Liebig's, and one was an incidental finding from Woodlands.

Fort Victoria recorded three incidental cases from two properties.

Of the above cases, 47 were tuberculin reactors from two properties. The overall incidence including reactors was approximately 0,000 03.

Johne's disease: Not suspected or confirmed.

Brucellosis: The following blood samples were tested:

Salisbury Laboratory	9 243 samples	623 positive
Bulawayo Laboratory	2 247 samples	108 positive
	11 490	731 (6·4%)

A survey of the incidence in cows being sent to abattoirs, which has been in operation for the last three years, was completed. In the final 3 375 blood samples the rate of infection was 4,3 per cent., which corresponds closely with previous findings of 5,5 and 5,2 per cent.

Eradication is as yet beyond our means. Control by vaccination with strains S.19 and 45/20 is encouraged. The Department sold 202 765 doses of S.19 vaccine and the alternative product is obtainable from commercial sources.

Vibriosis: As is to be expected, vibriosis has a very appreciable effect on the calving rate when it first infects a herd, but the condition is present in many herds where the calving percentage is above average. Nutrition is a much more important factor in this respect.

Bacillary white diarrhoea: 130 166 birds were tested on 74 properties. The disease has not been confirmed for many years.

Fowl typhoid: Sporadic cases occur, mostly in African-owned poultry.

Fowl cholera: 307 poultry deaths occurred in three outbreaks in the Sinoia area. The slaughter policy with compensation is applied.

PROTOZOAC DISEASES

Theileriosis: This condition in Rhodesia is due to *Theileria lawrencei* not *Th. parva.* Strenuous efforts—with a degree of success—were made to reduce the incidence of this disease. Deaths dropped from 426 on 48 farms to 232 on 37 properties.

Trypanosomiasis: Control of this disease and elimination of the tsetse fly are by far our biggest problems. During the period under review the total cattle exposed to some degree of risk of

nagana showed a further rise to 493 836. This is due to natural increase in the affected areas as there were no extensions of the existing salients.

Ensuring the health of these cattle has called for the taking and examination of 186 586 blood films, an increase of 13,2 per cent. over last year's figure of 164 768.

Parasites were detected in 5 710 of these specimens or 3,1 per cent. and a breakdown into species gives the following:—

T. congolense	4 151
T. vivax	1 414
T. brucei	4
mixed	135

Also in the course of the control of trypanosomiasis no less than 134 340 individual treatments were given of which 74 351 (55,3 per cent.) were prophylactic and 59 989 (44,6 per cent.) curative. There was a suggestion that resistance was developing to isometamidium at one centre in the Gokwe district but the matter resolved. The cause of the appearance of positive cases within the prophylactic period remains obscure.

In the Wankie district cases persisted at very low level in the Victoria Falls area. The origin of the outbreak is not clear and is still being investigated. Extensions were also noted at the end of the year from the western limits of the Binga district across the Gwai River, again threatening the Wankie National Park. With a total of eight cases, all to the north of the district on the Kana and Umzola drainages, the position in Lupane remains satisfactory.

Gokwe still poses the biggest problem in any one district. Although the total cases dropped from 3 253 to 1 993, the position is far from secure. Further improvement was noted in the central and Lutope areas but the Umniati and Copper Queen figures indicated persistent heavy challenge despite repeated insecticide treatment.

East of the Umniati the infection was literally confined to two centres on the banks of the river opposite the infected Copper Queen area. No reinfection was noted in the Chenjiri Purchase Area or Umfuli Tribal Trust Land.

The Zambezi Central Front also gave cause for concern, and in Urungwe European area and Vuti Purchase Area quite heavy challenge was experienced.

In Lomagundi the Doma–Mangula farms showed little change and constant supervision is necessary to prevent serious losses in valuable herds.

Little alteration was noted in Sipolilo but a distinct deterioration was recorded from eastern Chiswiti Tribal Trust Land and western Chimanda. Virtually the whole of Chimanda is now under threat and the total cases rose from 953 to 1 304.

South of the Mazoe River in the Mtoko and Inyanga districts the improvement achieved by tsetse control has been maintained and in both districts nagana remained at a very low level and confined to areas adjoining the Moçambique frontier.

In Chipinga there was no recrudescence of infection in the European Border farms and the 12 cases diagnosed were confined to the Umselezwe River area. This drainage system also accounted for one of the two foci of infection in the Sabi lowveld, the other being around the centre Chibuwe where *G. pallidipes* was located in dense bush.

The Sabi focus extended along the Turgwe and Makore rivers resulting in no less than 106 confirmed cases on Humani Ranch and 54 on Devuli where infection extended to B section and Angus Ranch. An unfortunate development was the reappearance of particularly virulent disease due to *T. vivax* and a number of deaths probably due to this cause.

The situation in Nuanetsi was completely satisfactory with not one single case in either privately owned or sentinel herds.

Summary of tsetse control

The full report of the Assistant Director of Veterinary Services (T. & T.C.) is available as a separate publication, so only a brief summary is given here:—

This year has been one of further intensive effort. From the figures given above under the heading of Trypanosomiasis, it will be appreciated that the work involves commendable patience, effort and skill on the part of the field staff of the Branch of Veterinary Services (Field).

The general pattern in the incidence of trypanosomiasis since 1960 has been that in any year the highest number of cases has occurred during the period April to June and the lowest during the period July to September, Table I.

During 1960, however, the numbers progressively declined, suggesting that the normal pattern had been upset (by the control methods then current) and that the disease position was improving. In that year, the shooting of game as a means of tsetse control was terminated. Subsequently, in 1961, the normal pattern became re-established and continued until 1964, when, in order to retrieve the deteriorating situation selective hunting operations were introduced, in October, and the use of persistent insecticide

Table I

Incidence of cattle trypanosomiasis: 1960–1971

Year	Quarter				Highest	Lowest
	1	2	3	4		
	Jan.–Mar.	Apr.–June	July–Sep.	Oct.–Dec.		
1960 . .	507	482	359	249	1	4
1961 . .	341	411	274	309	2	3
1962 . .	395	483	317	423	2	3
1963 . .	714	929	576	759	2	3
1964 . .	1 577	1 971	1 128	1 180	2	3
1965 . .	2 233	1 267	638	654	1	3
1966 . .	1 162	1 974	1 434	1 863	2	1
1967 . .	2 376	2 541	1 181	1 273	2	3
1968 . .	2 100	2 049	833	901	1	3
1969 . .	1 234	1 925	1 142	1 597	2	3
1970 . .	2 182	1 694	1 244	1 122	1	4
1971 . .	2 242	1 659	685		1	

deposits was intensified. Following these measures, the anticipated seasonal peak for the period April to June, 1965, did not develop and the cases for the period July to September were the lowest since the corresponding period of 1963. It appeared that the disease was again declining. During the last quarter of 1965, special national security precautions were introduced, and it became necessary again to discontinue hunting operations. Following this abatement of control effort the anticipated trough did not occur during the period July to September, 1966, and in 1967 the normal seasonal pattern reappeared, but at a higher level than ever before.

During 1968, after the gradual resumption of selective hunting operations and the extension of insecticide applications, the expected peak during the second quarter did not occur, but the third quarter still produced the lowest number for that year. In 1970, the sequence noted in 1960 recurred, suggesting that the disease was again progressively declining, and the incidence recorded during 1971 supports this suggestion. The number of cases for the period July to September, 1971, is the lowest since 1965.

The application of insecticide to the resting and refuge sites of tsetse flies proceeded smoothly from the beginning of June to the end of September. The operation was notable for the very few hold-ups caused by breakdown of transport, due to the excellent service provided by staff of the Central Mechanical Equipment Department. Forty-two spraying teams were deployed in the Sebungwe, Gokwe–Sanyati–Gatooma, Urungwe, Sipolilo–Doma, Darwin–Mtoko–Inyanga and Chipinga–Sabi/Lundi areas. A total of 164 966 kg of 75 per cent. wettable powder DDT was dispensed over 8 240 km² of tsetse habitat in Rhodesia by means of pneumatic knapsack sprayers. Conventional spraying was applied to 7 897 km² at an average rate of 277 litres of five per cent. DDT wettable powder suspension per km², and 343 km² were treated by grid pattern spraying at an average rate of 845 litres per km².

The continued success of the combined operations against *G. morsitans* in the Sabi–Lundi–Moçambique area is praiseworthy. The gains made last year have been consolidated and the indications are now that an area of 5 700 km² in Rhodesia and of 5 250 km² contiguous with it in Moçambique have been cleared of *G. morsitans* and *G. pallidipes*. Despite the continual presence of test herds of cattle and the continous operation of bait-ox surveys, no cases of trypanosomiasis have been recorded since July, 1970, and no *G. morsitans* or *G. pallidipes* have been caught in Rhodesia south of the Lundi since May, 1970, or in the Moçambique area within 57 km of the international border, since December, 1970. The 1971 international spraying operations, completed towards the end of September were conducted entirely within Moçambique. They are likely to have further consolidated these gains. Conventional spraying was applied to 628 km² using 113 196 litres of five per cent. DDT suspension at an average rate of 180 litres per km² and grid pattern spraying to 87 km² using 51 483 litres at an average rate of 592 litres per km². Rhodesia provided two teams and 4 196 kg of 75 per cent. DDT wettable powder.

It is becoming evident that where sufficient supervisory staff, materials and efficiently maintained transport can be concentrated in a carefully planned spraying operation, using 5 per cent. DDT suspension applied to the refuge and resting sites of *G. morsitans* there is a strong likelihood of success, even, as happened in the Sabi–Lundi–Moçambique operations, where tsetse flies are encountered within diffuse, uniform vegetation atypical of *G. morsitans* habitat. It must be said, however, that these operations have been most successful where they have been carried out

in the absence of indigenous farmers and their stock.

Where spraying operations have been conducted within or adjacent to areas containing cattle and other livestock clear cut gains are not so apparent. In the Copper Queen area, where spraying operations have been conducted annually since 1966, only partial success has been achieved. Collections of the blood meals taken by tsetse flies in this area have shown that cattle and donkeys form a major source of food for the local *G. morsitans* population, which, though apparently at a low level, is sufficient to maintain a high level of trypanosomiasis in the cattle. The difficulties of effectively controlling *G. morsitans* are greatly aggravated by the presence of stockowners and their animals. As one example, in the Copper Queen area this year, it was necessary to treat an area of uniform *Colophospermun mopane* woodland by means of intensive insecticide application on a grid pattern, in an attempt to eliminate a focus of *G. morsitans*. The operation was hardly completed before grass fires (started by the local stock-owners to encourage new grass growth or in the belief that this action would promote early rains), raged through the area, subjecting the new DDT deposits on the bark of the trees to intense heat. The effect of these fires has yet to be recorded but it is anticipated that the insecticide deposits will have become attenuated in some areas. The initial results of the spraying in terms of reduced tsetse fly catches at traffic control barriers and the reduced incidence of cattle trypanosomiasis during the course of the spraying operation are encouraging in most areas.

Tsetse control selective hunting operations proceeded throughout the year without interruption from extraneous sources. By the end of December, 1970, the situation in the Sabi-Lundi area of operations had improved sufficiently to warrant the suspension of the selective hunting operations in that area, and at the end of the rains, hunting operations in all areas were temporarily suspended during April and May to free staff for fence and road repair and maintenance work. Selective hunting operations, in which kudu, warthog, bushpig and bushbuck are shot within fenced areas accounted for 4 066 animals. Elephant and buffalo, while acting as hosts for the tsetse fly when they are available, are removed mainly as a fence protection measure. Most of the animals other than elephant, buffalo, kudu, bushbuck, warthog and bushpig were leopard or lion "kills" found within the fenced areas and recorded as "deaths by other means than shooting". The effect of these selective hunting operations is particularly noticeable in the Sebungwe/Gandavaroyi Tribal Trust Land area where, by this means alone, the *Glossina morsitans* population has been reduced to a very low level, and the threat of an easterly advance across the Sanyati River to the Tengwe and Urungwe Tribal Trust Land has been eliminated.

NON SPECIFIED DISEASES AND POISONINGS

Quarter evil: Confirmed deaths 339 head; deaths reported, 436.

Enterotoxaemia: Sporadic cases reported in flocks where vaccination has been neglected. 80 900 doses of vaccine were sold by the laboratory, though vaccine is also available from commercial sources.

Pasteurellosis: Fourteen deaths recorded in sheep from five properties. 38 000 doses of vaccine were sold by the Department.

Tetanus: Sporadic deaths occur in sheep, particularly where rubber rings have been used, or, more correctly, misused.

Tick-borne diseases:

	Deaths 1971	*Deaths 1970*
Redwater	203	355
Gallsickness	278	487
Heartwater	158	167

Bluetongue: Twenty-four cases occurred in sheep on twelve farms. 68 550 doses of vaccine were sold.

Horsesickness: Sporadic cases occur but most horses are vaccinated annually. 7 838 doses of vaccine were sold.

Botulism: This condition is not infrequently encountered in certain areas, and good results follow phosphorus supplementation or vaccination. 52 050 doses of vaccine were sold.

Otitis: An unusual septic condition affecting the deeper parts of the ear was encountered in some 600 cattle on twenty properties. When treated in the early stages by injection with large doses of penicillin and streptomycin the condition cleared up, but if allowed to progress, infection got established in the inner structures of the ear with fatal results. The cause is unknown, although it is suspected that it may be associated with the more extensive use of non-arsenical dips. In some instances these washes are allowed to get very foul and the solvents in organic dips may possibly facilitate the entry of bacteria by dissolving the normal layer of protective wax in the ear. Attempts to reproduce the condition experimentally was unsuccessful. There has been no reports of further cases recently.

Mineral and chemical poisonings: 975 deaths of which 501 were caused by arsenic and 150 by urea.

Plant poisonings: 1 395 deaths of which 659 were attributed to *Dichapetalum cymosum* (Um-

kauzaan) and 376 to Urgineas (tulps). Species of Albizzia came next accounting for 58 deaths.

Blood smears examined

Trypanosomiasis	5 704
Anaplasmosis	366
Redwater	193
Quarter Evil	68
Theileriosis	94
Heartwater	10
Miscellaneous	150
Negative	245 942
	252 527

Post-mortem examinations

	Bovine	*Ovine*	*Porcine*	*Poultry*	*Miscellaneous*	*Total*
Salisbury	453	299	89	7	51	899
Bulawayo	198	112	69	3 075	411	3 865
Umtali	164	82	13	87	10	356
Gwelo	253	83	19	53	26	434
Victoria	54	19	8	15	10	106
Sinoia	123	96	5	37	10	271
Gwanda	9	1	3	2	—	15
Chipinga	61	20	—	22	7	110
Total	1 315	712	206	3 298	525	6 056
1969–70	1 134	666	251	2 579	388	5 018

VETERINARY RESEARCH BRANCH

Diagnostic and advisory services continued at a high level as indicated by the following figures:

Summary of specimens examined

	1969–70	1970–71
Animals for post-mortem		
Poultry	4 030	2 900
Cattle	43	23
Sheep	78	66
Pigs	82	54
Chinchillas	101	72
Rabbits	186	163
Foetuses		
Cattle	261	208
Sheep	16	5
Brains for rabies	304	588
Blood samples for Brucellosis	21 259	9 243
Tampons	2 497	3 338
Milk samples	1 196	1 345
Faeces	917	964
Specimens for C.S.C. and Colcom	1 081	1 732
Miscellaneous	6 653	8 996
	38 704	29 697

The poultry post-mortems decreased by 1 130 due to the quiet disease position during the year, and the blood samples for brucellosis decreased by 12 016 due to the C.A. Survey being completed. The total of other specimens submitted increased from 13 575 to 17 582.

Vaccine sales

	1969–70 *Doses*	1970–71 *Doses*
Rift Valley Fever/Wesselsbron	967 710	230 610
Gallsickness	18 050	15 343
Redwater and Gallsickness	14 663	20 159
Contagious Abortion	226 918	202 765
Horsesickness	7 612	7 835
Anthrax	43 600	43 500
Calf Paratyphoid	8 698	7 362
Fowl Typhoid	15 900	24 100
Fowl Pox	419 100	489 300
Enterotoxaemia	123 600	80 900
Bluetongue	80 100	68 550
Nodular Worm Remedy	1 240	1 200
Lamsiekte	62 600	52 050
Rev. I	1 700	1 900
Newcastle Disease	266 085	594 670
Pasteurella	15 740	38 700
Tetanus	1 040	2 220
Lumpy Skin	413	300
Quarter Evil	322 495	Nil
Heartwater	86	12
Lamb Dysentery	50	900

The only major changes during the year were the falling off in demand for Rift Valley Fever/ Wesselsbron, due to the abatement of the outbreak, and the considerable increase in demand for Newcastle Disease vaccine and Pasteurella vaccine.

Artificial insemination

Three commercial outlets functioned during the year—Animal Breeders' Co-op., the Artificial Insemination Centre and Messrs. Agricura Rhodesia Limited. The latter company acted as distributors for semen obtained from the Transvaal Artificial Insemination Co-operative.

The breakdown of total sales by breeds is as follows:

Dairy —	Friesland	8 508
	Holstein	5 710
	Jersey	2039
	Ayrshire	913
	Geurnsey	344
Beef —	Simmentaler	8 918
	Charolais	6 518
	Brahman	2 680
	Sussex	1 022
	Hereford	1 015
	Afrikander	841
	Santa Gertrudis	125
	Aberdeen Angus	83
		38 716

Schistosomiasis: Dr. J. A. Lawrence completed his one year of study leave on this disease at the University of Rhodesia, and is continuing his research into the pathogenesis of these parasites. Work to date tends to indicate that although there is an initial setback in growth following heavy infestation, the animals resume their normal growth rate after a few months and there is no residual pathogenic effect. On this assumption, it is preferable to nurse and feed cattle to assist them in their own suppression of the parasite rather than resort to costly therapy.

Virology: Pending completion of our own virology unit, work has been carried out at the University of Rhodesia, and the kind assistance of Professor Cruikshank and Dr. Swanepoel is gratefully acknowledged.

The main virology project at present is concerned with the Bovine Virus Diarrhoea—Mucosal Disease complex.

Redwater vaccine: The late Dr. Matson had initiated work on a deep frozen redwater vaccine.

This project has been reopened by Dr. Goldschmidt and the duration of viability of this product is being checked.

Wild life research: Work on the role of wild life as reservoirs of certain diseases has continued, but is handicapped by lack of adequate quarantine stables and security. A small such unit is due to be completed before July, 1972.

RESEARCH BY THE TSETSE AND TRYPANOSOMIASIS CONTROL BRANCH

Tsetse behaviour

1. (a) Hitherto, our knowledge of the behaviour of tsetse flies in the field has been based on samples of following swarms taken by means of small hand nets. Male flies have predominated in these catches and much of our knowledge related to male behaviour. When resting tsetse flies and feeding tsetse flies were studied, however, a higher proportion of females appeared in the catches, and data began to be gathered on female behaviour.

The recent development of electrified trapping devices to stun and kill tsetse flies in various situations is yielding further valuable information on the behaviour of the female tsetse fly and is making it necessary to reconsider previous interpretations of their behaviour.

These devices have been constructed through a generous grant from the Cattle Producers' Association of the Rhodesia Farmers' Union.

(b) A comparison of the composition and nutritional state of tsetse populations from an untreated area and from an area from which warthogs and elephant have been removed showed that this action had not greatly affected either the numbers or well being of the resident tsetse flies.

Host preferences

2. Replicated experiments in which various walking or tethered animals are exposed to tsetse flies show that the apparent preferences shown by *G. morsitans* are in the order ox, kudu, donkey, bushpig and by *G. pallidipes*, ox, donkey, kudu, bushpig. This experiment is continuing with other baits as they become available. From identification of blood meals collected from tsetse flies having access to cattle, donkeys and game it appears that cattle and donkeys are preferred to the natural hosts.

Trypanosomiasis

Investigations continue on the pathogenicity of trypanosomiasis in sheep and goats, and of *Trypanosoma brucei* in cattle. Improvements are continually being made in the techniques used for the identification of tsetse blood meals.

The presence of large numbers of donkeys in a tsetse infested area, in the apparent absence of game animals and cattle has enabled a study to be made of the significance of donkeys in the aetiology of bovine trypanosomiasis.

MEAT INSPECTION

The detailed report of the Chief Veterinary Public Health Officer is issued as a separate report.

The predicted increase in cattle slaughter figures was far exceeded during the year with a rise of nearly 20 per cent. over the previous year's record total. While the Gatooma plant was able to take a little of the pressure from Salisbury, all other centres recorded new peaks of slaughter totals.

The reduction in sheep and goat totals is largely accounted for by reduced importations and direct sales to butchers. The numbers of pigs slaughtered at the main abattoirs were also lower because African hawkers were able to realize better returns from butchers and those supplying Bulawayo Cold Storage Commission appear to have been reluctant to go far afield to make purchases. It is expected that deterrents will fall away when Colcom's new pig abattoir at Bulawayo comes into operation.

Breakdown of cattle figures

	Bulls	*Cows*	*Oxen*	*Calves*
1970–71	1,6%	35,7%	60,7%	1,8%
1969–70	1,7%	25,14%	71,4%	1,7%

While bulls and calves remain at the same percentages as in the past few years, the trend towards a higher female kill has shown a marked upward move, so that more than one-third of total cattle slaughterings is now cows and heifers. In the absence of any evidence to the contrary, one must accept that the slaughter of females is not adversely affecting the breeding potential of the national herd; however, a certain amount of regret is inescapable when high quality heifers are presented for slaughter while less desirable types are being used as breeding stock.

Offtake from Tribal Trust Lands, represented by C.S.C. cattle slaughtered

During the past year, statistics have been assembled at three centres, Bulawayo, Victoria and Gatooma, detailing the total number of cattle bought by the C.S.C. at Tribal Trust Land sales, shipped either directly or after holding on ranches, to slaughter. With only part of the total kill reflected, the figure of nine per cent. that emerged is not accurate, but is a fair guide of the paucity of Tribal Trust Land cattle coming off the ground for beef purposes. The number sold directly to butchers and the number eaten at home are not easy to determine, but it is very doubtful if total African cattle slaughterings exceed the number which die of poverty annually.

Total condemnations of carcases

	Cattle %	*Sheep* %	*Goats* %	*Pigs* %
Salisbury	0,36	0,28	0,88	0,61
Bulawayo	0,51	0,26	0,89	2,35
Victoria	0,57	0,26	—	0,59
Gatooma	0,72	—	—	—
Umtali	0,91	0,89	2,85	0,16
West Nicholson	—	—	0,09	3,77
	0,51	0,34	0,32	0,99
1969–70	0,46	0,37	1,45	1,25

Only minor variations are recorded in the condemnation percentages this year, except that goats have shown a much better return due, largely, to a marked drop in emaciation condemnations.

Pigs have shown a further drop this year, to below one per cent., reflecting the smaller percentages of free-range pigs slaughtered. Condemnations for measles were down by six hundred carcases.

The slight overall increase in the cattle condemnation percentage is due largely to our old enemy drought in the lowveld and Matabeleland, with both emaciation and bull oedema figures having shown a disproportionate increase.

Cysticercus bovis

beef measles

Centre	*Condemned* %	*Detained* %	*Incidence* %	1969–70 %
Salisbury	0,04	1,52	1,56	1,25
Bulawayo	0,12	1,50	1,62	1,74
Fort Victoria	0,06	0,65	0,71	1,11
Gatooma	0,24	2,15	2,39	1,08
West Nicholson	—	—	—	—
	0,10	1,43	1,53	1,39

With the completion of a year's work at Gatooma, the relatively heavy concentration of measly cattle in the Midlands has been highlighted by a percentage incidence of 2,39. Fort Victoria and Bulawayo have shown a corresponding drop in incidence, with the re-routing of Midlands cattle to Gatooma.

The Salisbury incidence continues to increase, possibly due to the progressively younger age of slaughter stock.

The implementation of the new measles regulations has reduced the number of condemnations as predicted; only 6,5 per cent. of infested carcases were condemned outright, compared with ten per cent. in the previous year.

It is somewhat frustrating to realize that despite the best efforts of this Department in curtailing the incidence of human tapeworms through meat inspection, virtually nothing was done by our medical colleagues to reciprocate by identifying and treating human cases who shed eggs on to the grazing. In the present circumstances we can expect a steady increase of measly carcases as the years go by. The financial loss to the beef industry due to this condition is now well over $150 000 annually.

Hydatidosis

Centre	*Lungs* %	*Liver* %	*Total Cattle* %
Salisbury	0,20	0,02	0,22
Bulawayo	1,66	0,04	1,70
Fort Victoria	0,67	0,02	0,69
Gatooma	0,23	0,03	0,25
West Nicholson	2,17	0,00	2,17
Total	0,74	0,03	0,77
		1969–70	0,94

All centres show a reduction in incidence except Bulawayo, highlighting the geographical distribution of this parasite. Enquiries to Mpilo Hospital reveal that the occurrence of hydatid cysts in man in Matabeleland is practically nil, only a very few cases having been found as incidental lesions at post-mortem examinations over the past several years. We are perhaps fortunate in that the strain of parasite occurring here appears to be poorly adapted to man.

Liver fluke *(Fasciola gigantica)*

Centre	*Condemned* %	*Trimmed* %	*Incidence* %	1969–70 %
Salisbury	30,76	22,08	52,84	48,60
Bulawayo	17,68	2,86	20,53	16,24
Fort Victoria	10,97	1,38	12,35	18,56
Gatooma	35,86	4,62	40,48	—
Umtali	23,97	5,31	29,00	25,09
West Nicholson	—	—	0,0	—
	23,66	9,45	33,11	30,55

Gatooma slaughterings have again served to give a truer reflection of the geographical distribution of fluke; Victoria percentages are down, with the Midlands and Southern Mashonaland showing the second highest incidence of 40,48 per cent. All other centres show a slight increase, as does the overall figure, representing about 500 tonnes of lost liver.

The field trial being conducted by Provincial Veterinary Officer, Bulawayo and the Chief Veterinary Public Health Officer on Debshan has completed approximately one year, and results to date show no significant differences in performance between treated and control animals.

Tuberculosis

Centre	*Generalised*	*Local*	*Total Head*
Salisbury	0	0	0
Bulawayo	19	37	56
Fort Victoria	1	2	3
Gatooma	0	0	0
Umtali	0	0	0
West Nicholson	0	0	0
Total	20	39	59

Of the above cases, 47 were tuberculin cases from two properties. The overall incidence including reactors was approximately 0,000 03.

Traumatism condemnations

Trauma

Centre	Carcases	F/Q/legs	H/W/legs	Tails	Other wt. kg
Salisbury	30	25	33	92	4 401
Bulawayo	17	224	24	137	1 730
Fort Victoria	10	32	22	508	12 000
Gatooma	16	68	6	35	4 862
Umtali	5	2	2	7	947
West Nicholson	—	—	—	—	—
Total	78	351	87	779	23 940
1969–70	61 (660 qu. and limbs)			992	20 813

Apart from outright carcass condemnations which show a slightly increased proportion of animals slaughtered, all other returns are much more favourable.

SHEEP AND GOATS

Liver tapeworm *(Stilesia hepatica)*

Centre	Sheep and goat livers condmned	%	Ox livers condemned	% Incidence
Salisbury	24 195	93,2	138	0,08
Bulawayo	24 445	93,5	919	0,71
Fort Victoria	6 746	97,5	287	0,35
Gatooma	—	—	158	0,25
Umtali	3 535	66,6	72	0,63
West Nicholson	11 023	87,4	—	—
Total	69 944	90,4	1 574	0,37
1969–70	78 983	89,0	1 330	0,37

The incidence of this parasite continues to fluctuate narrowly around the 90 per cent. mark in sheep, and remains unchanged in cattle.

PIGS

Pork measles *(C. cellulosa)*

Centre	% of Carcases Condemned	1969–70 Incidence
Salisbury	0,12	0,19
Bulawayo	2,13	2,55
Fort Victoria	0,28	0,74
Gatooma	—	—
Umtali	0,03	0,04
West Nicholson	3,67	4,03
Total	0,58	0,87

A further marked reduction in measles this year is attributable to a parallel drop in free-range pigs slaughtered. Over 80 per cent. of slaughter pigs originated from European owners, and the number of African-owned pigs dropped by over 13 000.

The West Nicholson figures are indicative, in that 99 per cent. were African-owned, and the incidence of *C. cellulosae* was 4,03 per cent. Also noteworthy at this centre is the fact that 40 carcasses were lightly infested in terms of the new regulations, and were frozen accordingly.

Actual incidence of measles in free-range and sty-raised pigs is as follows:—

(i) Free-range: 3,16 per cent.
(ii) Sty-raised: 0,013 per cent.

A table of the broad ownership groups is as follows:—

Ownership group proportions are as follows

Centre	European % of total	African % of total
Salisbury	92,6	7,4
Bulawayo	48,1	51,9
Fort Victoria	78,5	21,5
Umtali	77,2	22,8
West Nicholson	1,3	98,7
Total	80,9	19,1
1969–70	69·3	30,7

Milk spot livers *(Ascaris suum)*

Centre	% of livers condemned	1969–70 incidence
Salisbury	10,3	10,7
Bulawayo	7,3	5,3
Fort Victoria	13,7	13,7
Gatooma	—	—
Umtali	18,9	17,1
West Nicholson	3,4	3,3
Total	10,7	9,5

The slight increase this year is probably due to the higher proportion of sty-raised pigs.

Lymphadenitis—tuberculosis, mycobacterial and purulent

No generalised cases of tuberculosis-like lesions were disclosed. Submaxillary lymph nodes with caseated or calcified lesions were most common at West Nicholson (17 cases).

One case occurred at both Salisbury and Bulawayo.

Purulent lesions occurred as follows:—
Salisbury, 591; Victoria, 31; Bulawayo 7 and Umtali, 5.

Pyaemia

This condition continues to give cause for concern in Salisbury, where 352 carcasses were condemned, compared with:—

Bulawayo, 15; Victoria, 12; Umtali, 3 and West Nicholson, 1.

Experience in Bulawayo has shown that many carcasses with multiple abscessation, which must be considered pyaemia in the absence of a bacteriological examination, are in fact free from circulatory organisms when routine samples are cultured in the laboratory.

The practicability of detaining suspect carcasses for one to two days while cultures are undertaken will be investigated at Colcom, and the saving of a considerable proportion of these carcasses could result.

Animals dead on arrival

Centre	*Cattle*	*Pigs*	*Sheep and goats*
Salisbury	12	72	—
Bulawayo	16	5	5
Fort Victoria	—	—	1
Gatooma	—	—	—
Umtali	—	3	—
West Nicholson	—	—	—
	—	—	—
Total	28	80	6
1969–70	34	140	12

Trauma, stress and poverty were the chief reasons for death, and only isolated cases of infectious diseases were encountered, none of them notifiable.

Game carcass inspection

Once again it is only Mazunga that has been operating on a regular basis.

Returns are as follows:

Mazunga	3 618
Wankie	Nil
Chiredzi	282
Total	3 900

The predominant species was again impala, with small numbers of other antelope, zebra and wart-hog making up the total.

MEAT HYGIENE LABORATORIES

Both Bulawayo and Gatooma laboratories have had a busy year, and the Salisbury centre has enjoyed the facilities of the Research Laboratory for meat bacteriology purposes.

Monitor swabs for salmonellas
Abattoir and meat products

(a) *Bulawayo*

Sites samples included: clean offals, rough offals, carcasses, casings, sewers, gall bladders, mesenteric lymph nodes, abattoir effluent, pig intestinal contents, rumen contents, pluck table, and various meat and other samples.

Total swabs—2 659.

Total positives for Salmonella—41 or 1,54%.

The most regularly contaminated samples were the compound sewer (17%).

Casings	(24%)
Rough offal	(6%)
Abattoir effluent	(26%)

Beef carcasses showed five positives out of 755 samples.

(b) *Gatooma*

Sites samples were similar to those in Bulawayo, with boning room tables replacing pig specimens:

Total swabs—1·939.

Total positives—6 or 0,3%.

The positive swabs came from:

Bile receiver	—3 (29 samples), i.e. 10%
Carcass	—1 (770 samples), i.e. 0,14%
Centrifuge	—1 (68 samples), i.e. 1,5%

Both centres show a low rate of salmonella contamination overall, and in Bulawayo the figures compare favourably with the previous year's rate of 5,5 per cent.

Census of stock—attached.

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J. M. WILLIAMSON,
Director of Veterinary Services.

Census of cattle, 1970–71

District	European-owned cattle	African-owned cattle	Total cattle
Mashonaland	817 131	582 369	1 399 500
Matabeleland	473 216	514 083	987 299
Midlands	434 578	478 569	913 147
Manicaland	190 494	394 703	585 197
Victoria	329 799	536 782	866 581
Gwanda	105 894	177 889	283 783
Sinoia	293 067	91 674	384 741
Chipinga	64 818	67 908	132 726
	2 708 997	2 843 977	5 552 974
1969–70	2 478 643	2 729 586	5 208 229
Difference	+230 354	+114 391	+344 745

Small stock census

	Pigs			Sheep			Goats			Equines		
	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total
Mashonaland	49 488	28 342	77 830	123 015	26 727	149 742	9 765	103 545	113 310	3 462	6 746	10 208
Matabeleland	7 906	23 119	31 025	47 867	121 323	169 190	8 334	588 656	596 990	2 264	48 381	50 645
Midlands	8 533	23 290	31 823	43 597	60 099	103 696	5 695	235 382	241 077	1 179	36 676	37 855
Manicaland	6 420	8 334	14 754	29 830	87 733	117 563	2 355	180 740	183 095	657	2 366	3 023
Victoria	3 770	20 178	23 948	26 123	128 790	154 913	4 045	309 080	313 125	625	18 632	19 257
Sinoia	5 900	11 798	17 698	42 902	13 121	56 023	3 533	26 735	30 268	728	1 950	2 678
Gwanda	1 023	2 586	3 609	5 438	49 518	54 956	1 139	179 999	181 138	121	18 477	18 598
Chipinga	830	1 157	1 987	8 241	10 340	18 581	161	45 834	45 995	389	2 108	2 497
Totals	83 870	118 804	202 674	327 013	497 651	824 664	35 027	1 669 971	1 704 998	9 425	135 336	144 761
1969–70	92 593	130 949	223 542	360 128	479 546	839 674	39 126	1 615 277	1 654 403	8 669	97 428	106 097
Difference	−8 723	−12 145	−20 868	−33 115	+18 105	−15 010	−4 099	+54 694	+50 595	+756	+37 908	+38 664